THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

[REGISTERED AS A NEWSPAPER.]

VOL. XXXIII. No. 832.] LONDON, APRIL 22, 1879. [31ST YEAR.] Price 6d.

GAS PURIFICATION
BY
OXIDE OF IRON.

COOKE BROS.,
CENTRAL DEPÔTS:
CO. DONEGAL, IRELAND;
LONDON DEPÔT:
BLACKWALL, E.;
OFFICES:
26, 27, & 28, FENCHURCH ST.,
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GENUINE TORBAY PAINT
And SPECIAL GASOMETER PAINT.
SEVERAL PRIZE MEDALS. ESTABLISHED OVER 20 YEARS.
These Paints are now used in over 200 Country Gas-Works, and by all the London Gas Companies, on Gas-holders, Scrubbers, Purifiers, &c. Also used by the Admiralty, War Office, Railway Companies, Founders, &c. They prevent and arrest rust, and protect iron from the action of water, sulphureous and gaseous exhalations; do not crack, blister, or flake off; will cover tar effectually.
The covering powers are considerably greater than those of any other Paint.—*See "Engineer," Nov.* 2, 1866.
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Gas, Water, & Sanitary Purposes,
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WOOD GRIDS
FOR
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JOSEPH COWEN and CO.,
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J. C. and Co. have been for many years the most extensive Manufacturers of Fire-Clay Retorts and Fire-Bricks in the Kingdom. Orders for Fire-Clay Retorts of all shapes and dimensions, and to fit any shaped Mouthpiece, Fire-Bricks, and every other article in Fire-Clay, are promptly executed at their Works as above.
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CAST & WROUGHT IRON TANKS FOR DITTO,
And Gas Apparatus of every Description.
Marine, Tubular, Cornish, Plain, Furnace, Saddle, and Range Boilers.
SUGAR, SALTPETRE, AND ALL KINDS OF PANS.
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See Page 586.
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LESMAHAGOW
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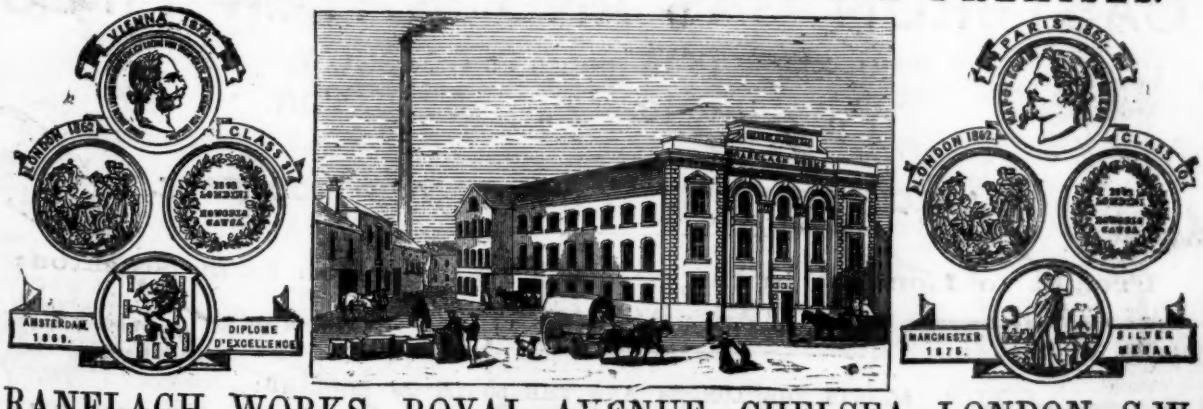
GEORGE GLOVER AND CO.,
DRY GAS-METER MANUFACTURERS,
HAVE REMOVED TO MORE EXTENSIVE PREMISES:



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IMPROVED CONSUMERS WET GAS-METERS

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THE UNVARYING WATER-LINE GAS-METER,

AND

IMPROVED DRY GAS-METERS;

STATION-METERS OF ALL SIZES, with PLANED JOINTS;

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And all kinds of Experimental Gas Apparatus.

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ALSO PATENT DRY COPPERAS FOR EXTRACTING AMMONIA.

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IMPROVED HYDRAULIC CRANES,

Effecting a great saving in the cost of discharging Coals from Vessels, Barges, &c. Several of these Cranes, with the necessary power, are now being erected at the Beckton Gas-Works.

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Sixteen recently erected at Beckton, applied to Covers 30 feet square.

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IN SUCCESSFUL OPERATION AT THE NEW WORKS OF THE NEWCASTLE AND GATESHEAD GAS COMPANY.

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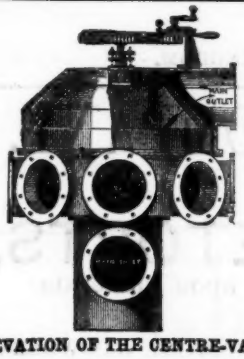
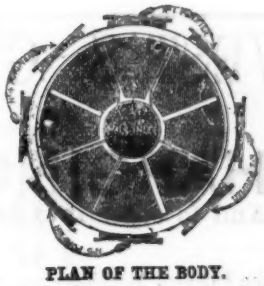


ELEVATION OF THE CENTRE-VALVE.

PLAN OF THE VALVE.



PLAN OF THE BODY.

These PATENT CENTRE-VALVES are the most perfect and certain means for working Purifiers on the system of three in action, and one out of action. The Valve itself is protected from all injury inside the safety cover. The working of the Valve is so easy, and so governed by the stop-catch movement, that the Purifiers can be instantaneously changed in the dark as well as in daylight. They are scraped perfectly true, metal to metal, the facings heretofore exposed are always covered, and there is nothing more reliable, certain, and durable in a gas-works. By their use the floor of the Purifying-house is clear and level; the Valve and all connexions being beneath the floor, out of the way of working. A considerable improvement and saving is effected in the cost of the connecting-pipes.

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They beg special attention to the excellence and superiority of their WET and DRY METERS, several thousand being now in use by many of the largest Gas Companies in the West of England and South Wales. Warranted to measure correctly, and not to vary. Their acknowledged superiority has brought them into general use more rapidly than any Meters hitherto manufactured. A guarantee of Five years tendered with each Meter.

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TENDERS GIVEN FOR WORK FIXED COMPLETE IN ANY PART OF THE KINGDOM.

WEST'S GAS IMPROVEMENT COMPANY,

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ARE NOW PREPARED TO SUPPLY AND ERECT THEIR PATENTED MACHINERY FOR

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And to enter into arrangements with GAS COMPANIES for its use upon moderate terms of Royalty.

The Patented Machinery has secured the approbation of all Engineers who have visited the MAIDSTONE GAS-WORKS, *where it is in full operation, and may be inspected at any time on application to the Manager.*

The advantages attending its use are—

INCREASED VOLUME OF GAS PER TON.—INCREASED YIELD PER RETORT.—INCREASED BULK OF COKE FOR SALE.—REDUCTION IN LABOUR AND LESS DEPENDENCE ON SKILLED STOKERS.

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MANUFACTURERS OF ALL DESCRIPTIONS OF

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FOR PURIFIERS, GASHOLDERS, BYE-PASS, AND OTHER ARRANGEMENTS REQUIRING VALVES IN GAS-WORKS.

The Faced Valves, as made by the Patentees, continue to give great satisfaction, and they are being used extensively by many of the best gas engineers of the day.

They are more easily repaired than any other kind of Valve in use, and can be re-ground in a few hours without removal, and made perfectly gas-tight.

References can be given to many Engineers of high standing, who will testify as to the favour in which they are held.

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And every Description of Gas Apparatus.

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OF THE HIGHEST EXCELLENCE ONLY;

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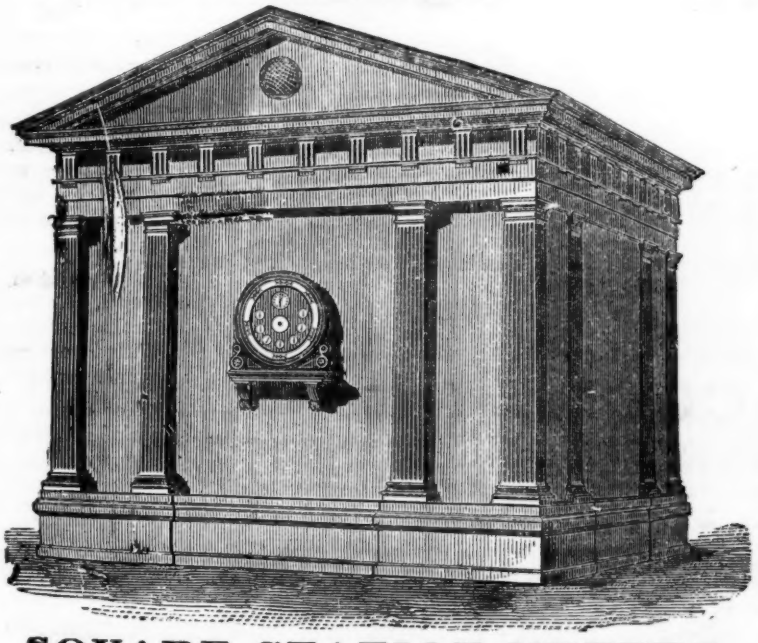
WARNER & COWAN'S PATENT SELF-REGULATING GAS-METERS;

ROUND STATION-METERS,

ON CAST-IRON STANDS.



SQUARE STATION-METERS,

WITH PLANED JOINTS.

GOVERNORS, GAUGES, INDICATORS, MAIN COCKS, &c.

GAS COOKING APPARATUS.

Home and Foreign Orders promptly attended to.

All Sizes of CONSUMERS METERS, STATION-METERS, and GOVERNORS generally in Stock.

Orders almost invariably despatched on the day of receipt.

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WOOD PURIFIER SIEVES,

Which have now been used for fifteen years, and their advantages and durability fully established. They are made entirely by steam machinery in very large quantities at the most moderate cost.

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ESTABLISHED IN 1860.

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Manufacturers for Home and Export.
GAS-RETORTS, GLASS-HOUSE FURNACE,
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And Every Description of Best Fire-Bricks.

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Plans and Estimates furnished; Gas-Works, Apparatus, Pipes, Machinery, Fire Goods, &c., supplied, or Attested and Shipped for Exportation.

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Mr. ROMANS has for upwards of 30 years been practically engaged in the Manufacture of Gas, and has, by extensive experiments, ascertained that by JUDICIOUS INTERMIXTURE of the lighter with the heavier gases, much of the rich Hydrocarbons CAN BE SAVED, which otherwise ARE LOST, during the process of manufacture. He is therefore enabled to give advice to those who favour him with their orders for Cannel, as to the class which will secure for their standard of illuminating power the HIGHEST ADVANTAGEOUS RESULTS.

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PORTABLE PIPE SCREWING MACHINE,

For 1 in., 1¼ in., 1½ in., and 2 in. Gas Threads, complete £7 10s.

In use at the chief gas-works, and giving great satisfaction.

For other useful goods, see Bailey's "Illustrated Inventions," post free 3s. 6d.; gratis to ledger customers.

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Brassfounders, Gauge Injector and Tool Makers,
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SHEAF AND SPRING WORKS,

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FOR ENGINEERS,

STEEL OF ALL DESCRIPTIONS,

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The only Gold Medal awarded for "Apparatus and Processes for Heating and Lighting" by the Imperial Commissioners.

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GOLD MEDAL for Chandeliers and Gas-Fittings.

GOLD MEDAL (Rappel) for Metallic Bedsteads and Furniture.

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Ornamental, Taper, and Cased Tubes; Tin Tubes;

GAS-FITTINGS, CHANDELIERS,

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REGISTERED TRADE MARK:
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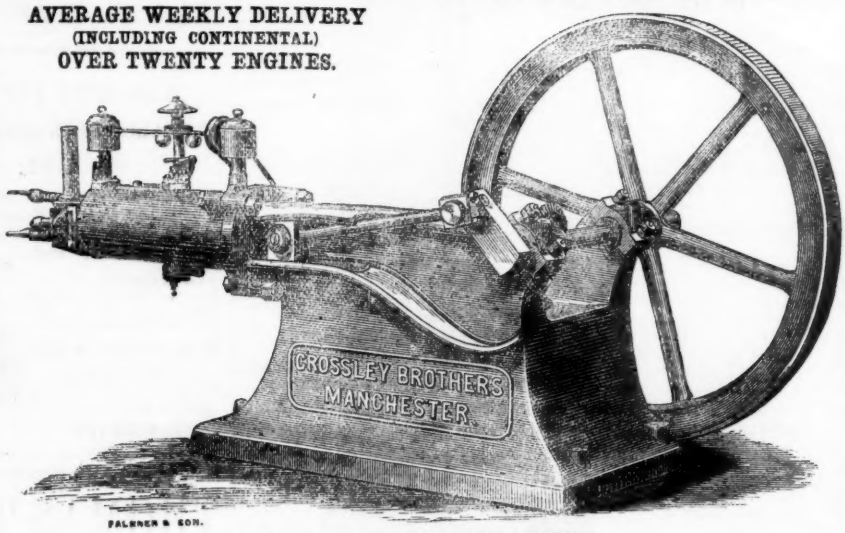
LONDON OFFICES & SHOW-ROOMS: 141, FLEET STREET, E.C.

AN ENGINE WHICH WORKS WITHOUT A BOILER OR STEAM

AVERAGE WEEKLY DELIVERY
(INCLUDING CONTINENTAL)
OVER TWENTY ENGINES.

The durability of these Engines is now established by experience, one of them having run night and day at the Hinckley Gas-Works for over Twelve months without any expenditure for repair; this being equal to about 2½ years average work.



Over 1900 already delivered.

Very numerous Testimonials from Users, including Engineers, Men of Science, and others, on application to the makers.

No trouble with Coal, Ashes, Smoke, Insurance, Water, or constant attendance

No Glands to pack, or Water Gauges and Steam Gauges to watch.

STARTS AT A MOMENT'S NOTICE.

THE "OTTO" SILENT GAS-ENGINE.

(Otto and Crossley's Patents, 1876 and 1877.)

THEY ARE USED FOR ALL KINDS OF PURPOSES, CHIEFLY FOR HOISTING, PRINTING, & PUMPING.

DELIVERED IN MANCHESTER.

SIZES { NOMINAL HORSE POWER ½ 1 2 3½ 6 8 12 16
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PRICES INCLUDE CAST-IRON STAND, TURNED FLY-WHEEL, AND DRIVING PULLEY; WATER-VESSEL, SEVERAL DUPLICATES, AND GAS-FITTINGS (EXCEPTING METER AND PIPES).

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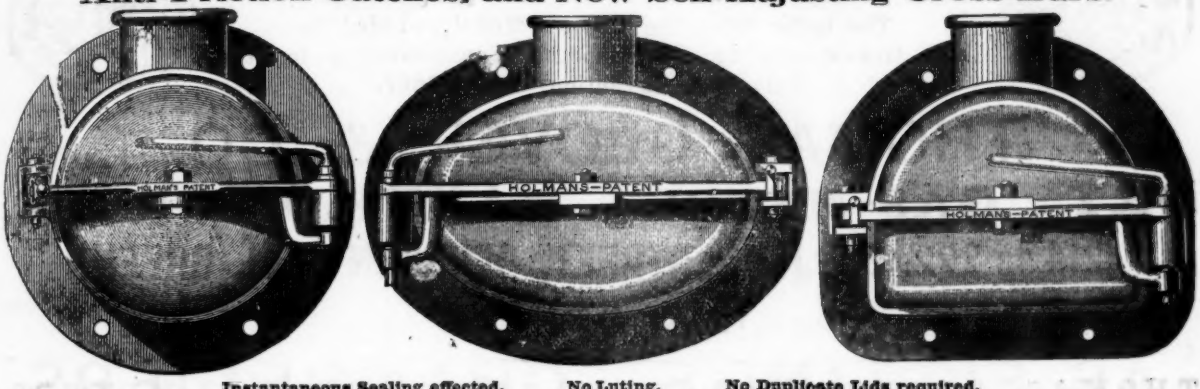
CORNWALL HOUSE, 35, QUEEN VICTORIA STREET, LONDON, E.C.,

(LATE OF 10, LAURENCE POUNTNEY LANE.)

SOLE MAKERS OF MORTON'S PATENT SELF-SEALING RETORT-LIDS,

WITH HOLMAN'S PATENT ECCENTRIC FASTENINGS,

Anti-Friction Catches, and New Self-Adjusting Cross-Bars.



Instantaneous Sealing effected. No Luting. No Duplicate Lids required.
Holman's New Self-Sustaining Cross-Bar ensures freedom of Joint, and maintains parallel position of the Lids.

Since their introduction in 1869, these Patent Retort-Lids have been thoroughly tested, being now in use in nearly all the principal Gas-Works in London and the Provinces.

T. B. and H. are now making the "Morton's Self-Sealing Lid" of the SAME FORM OR SECTION AS THE RETORT (see Illustrations above), as well as bringing the Mouthpiece from the D or Oval at back to Circular in front, as heretofore.

D and Oval Morton's Lids are working satisfactorily both in this country, on the Continent, and in the United States of America. Among others they have been adopted by the following Gas-Works:—

The Gaslight Company's Works, Fulham; Ditto, Bromley-by-Bow; Ditto, King's Cross; Ditto, Shoreditch.
And also in the Gas-Works at Richmond, Maidstone, Gloucester, Glasgow, Portsea, Roubaix (France), The Hague (Holland

HUNT'S PATENT EQUILIBRIUM GAS-GOVERNOR.

In this Governor a Throttle-Valve is substituted for the ordinary suspended Cone, all external communications being avoided by placing the Lever or Radius Arm (shown in the drawing) inside the Valve-Chamber upon the Disc. The Disc is carried upon steel centres, upon which it is accurately balanced and turns freely. The friction in working is thereby reduced to a minimum. This Governor is extremely sensitive to alterations of inlet or outlet pressure, and renders a large actuating holder unnecessary.

The principal advantages of this arrangement over the ordinary form of Governor are as follows:—

Its sensitive action prevents oscillation.

It is self-adjusting—*i.e.*, it maintains a steady pressure under variations of inlet pressure or a fluctuating consumption.

The inlet to Gasholder being contracted to the smallest possible dimensions, all danger from leakage through insufficiency of seal, tilting, &c., is entirely avoided.

The valve portion being separate from the holder, it can be handled and fixed like an ordinary Slide-Valve direct in the main; and the holder can be placed at an convenient distance immediately above it. The cost is thus materially reduced, and the inconvenience of heavy lifts done away with.

There are no working parts likely to get out of order.

These Governors have been adopted by many leading Gas Companies, among whom are the following:—

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TESTIMONIAL.

The Gaslight and Coke Company,
9, Water Street, New Bridge Street,
Blackfriars, E.C., Feb. 27, 1875.

MESSRS. TANGYE BROTHERS AND HOLMAN.

Gentlemen,—The two 24-inch and three 36-inch Hunt's Equilibrium Governors supplied by you, and fixed in the valve-rooms at Whitechapel, Goswell Road, and Blackfriars, are working very satisfactorily.

Yours truly,

(Signed) JOHN JOHNSON.

PRICES AND FULL PARTICULARS ON APPLICATION.

THE "SPECIAL" STEAM-PUMP.

Diameter of Steam Cylinder.	Diameter of Water Cylinder.	Length of Stroke.	Gallons of Water per Hour, Approximate.	Reduced Prices.
3	1½	9	450	£16
4	2	9	815	18
5*	2½	12	1,250*	20
5*	3	12	1,830*	22 10
4	4	12	3,250	25
6*	4	12	3,250*	30
5	5	12	5,070	32 10
7*	5	12	5,070*	40
6	6	12	7,330	40
8*	6	12	7,330*	50
7	7	12	9,750	50
10*	7	12	9,750*	65

In use in a Hundred Gas-Works in the United Kingdom for Pumping Ammoniacal Liquor, Water, or Tar.

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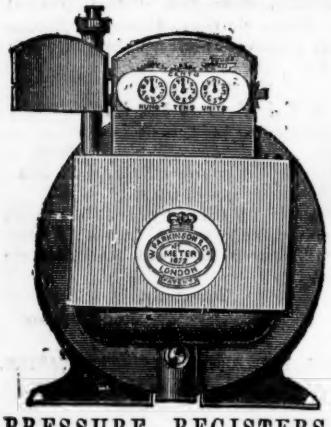

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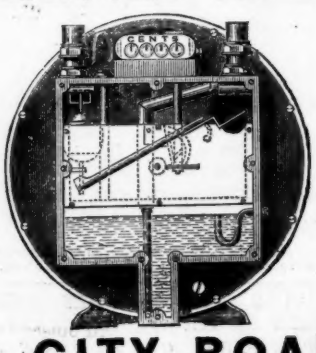

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TO CORRESPONDENTS.

No notice can be taken of anonymous communications. Whatever is intended for insertion, must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.

THE JOURNAL OF GAS LIGHTING,
WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, APRIL 22, 1879.

Circular to Gas Companies.

THE strike of the Durham coal miners can only be looked on by Gas Companies with some uneasiness. Not a few in the southern districts draw their supply from the mines in this locality which are now unworked. At this season of the year, when contracts are being made, there is no doubt that the opportunity will be taken for standing out for higher prices. Contractors will very probably consider that we are at the beginning of a struggle, the end of which cannot, at the present moment, be foreseen. Certain it is, that the idleness of forty or fifty thousand miners must very seriously diminish the output, and, if stocks have not been well kept up, a short supply must result. We have at present no reports that any inconvenience to Gas Companies has resulted from the action of the miners, and perhaps none will. The strike, we hope, is nearly at an end, but the spirit of disaffection, if we may so call it, among the men, is by no means quieted, and we may look forward to repeated protests against the reduction in the price of labour. The iron trade is reviving, and, together with that revival, a rise in the price of coal will necessarily take place. We shall probably have to wait two or three years for another famine; but it may be as well to look ahead. Coal is certain to rise in price, and the lesson so dearly learned must be kept in mind. The great object in the present day is to husband resources, so that when the day of trial comes, Gas Companies may be prepared to meet it. In another column will be found the opinion of our very experienced correspondent who reports for us on "The Coal and "General Trade of the North of England." It appears from this that the gas coal pits in the Durham district are, for the moment, entirely closed, and that, there being no coal at bank, the vessels ordinarily carrying southwards have been either laid up or sent on other duty. The strike, it is certain, cannot last much longer; but, in the meantime, much difficulty may be experienced, and in the future heavier charges for gas coals may result. The stoppage of a great industry like that of the raising of coal, can only be looked on with dismay. It not only affects Gas Companies, but what we may call, without offence, the far more important industry—the manufacture of iron. It used to be said, "Cotton is King;" but to-day we recognize the fact that the manufacture of iron represents the material prosperity of this country. It is, as we have said, just as the iron trade is reviving, that this disastrous interruption to work takes place. We can express no opinion on the struggle between masters and men. Which is to blame, it is not our business here to inquire. The struggle will soon be over; but then comes the difficult question to answer, How soon may it be revived? What we fear is that every now and then disturbances of labour will take place, and the thought of this must necessarily make coalowners and contractors cautious.

Dr. Lyon Playfair, C.B., has, as every one expected would be the case, been elected Chairman of the Select Committee appointed to inquire into the electric light, and as to the necessity for parliamentary interference, should it promise to be generally adopted. The matter offers a wide scope for inquiry, and we have no doubt the learned Chairman will assist to the utmost in having the matter thoroughly investigated. But we really do not see, at the present moment, what is to come of the inquiry, or to what it can lead. The electric light is unquestionably a fact. So are balloons, and it is proposed to make these latter useful for the purposes of aërial navigation. If we could follow it out, we think that but little difference would be found between aëronautics and the electric light, and a Parliamentary Committee might as well be appointed to consider what passenger-tax should be imposed upon voyagers in balloons, and what regulations should be adopted to control their departure and arrival.

We are promised a grand display of electric lights at the Royal Albert Hall, South Kensington. A collection is to be made of all the recent inventions for producing and distributing electricity for illuminating purposes. To give a scientific air to the exhibition, as becomes South Kensington, illustrative lectures are to be delivered, the first of which will be given by Mr. W. H. Preece. We do not see that the progress of the electric light is likely to be advanced by exhibitions of this kind. Much more will be required before any general use can be made of the light, except for outdoor uses. It must be confessed by every one that the present display at the Albert Hall is most unsatisfactory. A great deal more invention will be required before that minute distribution of the electric force, which will adapt it for domestic purposes, is achieved.

In the meantime, the liberal use of gas in large burners is fast being recognized as a better and cheaper illuminant than the electric light. Our correspondent, Mr. King, kindly sends us the results of experiments he has made with Sugg's large Argands at Liverpool. The gas of his Company is, we think, richer than any which has hitherto been used in the large burners, and we have no doubt Mr. King is perfectly correct when he says that the results he obtained are the highest yet reached with those burners. We see, however, in our London streets, the results obtained with common sixteen-candle gas. The use of these burners is certain to extend, not perhaps over the whole extent of our thoroughfares, but in certain places where, for many reasons, it is advisable to have strong light. A candid observer will at once admit the superiority of gas over the electric light, and, light for light, we now know beyond doubt that the former is much cheaper.

An attempt is being made to create a movement against gas lamp-pillars. We are willing to admit that they are seldom ornamental, and have several disadvantages. At the same time, we cannot recommend a return to the practice followed "in the "days of the Tudors," and have our lamps suspended from brackets attached to houses. Householders, in these days, very much object to have their walls interfered with for the purpose of fixing a strong bracket. Moreover, the light is not wanted

close to houses. Not merely a narrow strip of pavement requires to be lighted, but the whole of the thoroughfare, and the lamps need to be placed as near as possible to the roadway. In this position they undoubtedly invite the attention of careless drivers of badly-loaded vans, who very often sweep them down. Still, they are necessary institutions, and, for the present, cannot be dispensed with.

An agitation has been got up at Norwich against the charges made by the British Gas Company for gas. There is an asylum some distance—we do not know how far—from the city, to which the Company have agreed to supply gas, after laying down, at their own expense, a main to convey it. Considering the distance, the Company very properly add an extra shilling to the charge made in the city, for the next ten years, in order to recoup themselves for the expense of laying the main, and after that time has elapsed, the charge will be the same as in the city. The great grievance is that the Company charge more for gas in Norwich than in Hull. If the Town Council of the former were acquainted with all the circumstances of the case, as the Directors of the Company are, they would at once appreciate the reasons for the difference. As it stands, however, it must be admitted that Norwich is very well served with gas. The complaints which are prevalent obviously arise from bad fittings improperly placed. It is satisfactory to be informed that the reserve-fund of the Company is now, so far as Norwich is concerned, nearly full, and that the prospect opens for a reduction of price at no distant period. We shall not say that gas is too dear in Norwich; but still, if an extension of its use be wished for, we think it must be supplied at a cheaper rate.

The Nottingham Corporation are once more about to enlarge their gas-works. It seems almost impossible to keep pace with the demand for gas wherever its use is popular. We may take it that no obstacles will stand in the way of the progress of the measure now before Parliament, so the Corporation will be free to make any additions they may think necessary to the works. The extensions at Radford are highly desirable, and will, no doubt, be commenced at once. Whether additional storeage should be provided at Basford or Radford, is a question for the eminent Engineer who superintends the undertaking to decide, and the only thing we have to say is that storeage for at least the maximum consumption of a day should be provided.

Economy is always the order of the day with Vestries where no special interests are engaged. The Committee of Works for Clerkenwell have just passed a resolution to change the five-feet burners in the public lamps to four-feet, and to reduce the hours of consumption. A member of the Committee calculates that the alteration in the hours of consumption and the burners would result in a saving of £700 a year, which, he thinks, may very properly be applied in adding to the number of lamps now in use. We quite agree with him, but at the same time it must be pointed out that five-feet burners are relatively of much greater power than four. We are certain that if the change be made, complaints will soon arise. Already, in the Committee, doubts were expressed as to whether a householder would find his way home, with his path illuminated by four-feet burners. The parsimony of Vestries in the matter of gas supply is greatly to be regretted. Our own impression is that no rate is paid more cheerfully than the lighting. The single complaint is that the light is not more effective; and, from our own experience, we are bound to say that the deficient illumination is generally ascribed to the niggardliness of the Local Authorities.

Beverley bought gas-works a long time ago, and, as a matter of course, they have become increasingly profitable. Curiously enough, the special Act which the Corporation then obtained directed that the excess of profits of the gas undertaking should be applied in the repair and maintenance of the roads and pathways. The thoroughfares of Beverley were, no doubt, at that period, in a very bad state, but the use of gas tar and ashes seems to have brought them into a proper condition. In passing, we may remark that, properly made, artificial asphalte is one of the best paving materials in use. It completely prevents the eruption of air from the subsoil, which is, beyond all question, the great cause of the spread of epidemic disease. That is by the way. The Corporation last year made a profit on the gas undertaking of £575, out of which they allotted £200 to the credit of the highway-fund, and at the same time voted all the tar and ashes required for the maintenance of the thoroughfares. The undertaking is evidently a very flourishing concern, and we are happy to see that a proposal has been made to reduce the price of gas fivepence per thousand feet.

The petroleum trade seems likely to receive a great extension. Of course, difficulty has been experienced in transporting it from the wells to the nearest shipping port. It is now proposed to lay a pipe, a little over a hundred miles in length, from the Bradford Oil Wells to Williamsport, in Pennsylvania. Whether this will tend to cheapen petroleum in this country remains to be seen. At the present time, it must be admitted that the retail charge for rectified oils is so high, that small consumers would be greatly benefited by consuming gas, if they were only furnished with proper fittings and appliances. The season is now coming on when fires will no longer be wanted, and already we are told by dealers that petroleum cooking-stoves are in much demand. Gas, as we have said, would be cheaper, cleaner, and better; but, after all that has been done, it requires something still to bring the gas-stove home to the mind of the Englishwoman.

A communication on the relative values of Welsh coal and coke for evaporative purposes will be found in another column. Several experiments have been made, and it has been found that good gas coke generally holds its own against anthracite. Chemically, the compositions of the two things are very closely allied. The amount of carbon is, in each case, pretty nearly the same, and this is the heat-giving material. It is a question of price, and it is shown plainly, by the experiments made at the Dover water-works, that the use of gas coke is very much cheaper than Welsh steam coal. The publication of these results will, we hope, promote the use of gas coke for evaporative purposes.

We may announce the fact that Mr. J. Booth, of Middlesbrough, resigned his position as Gas Manager before a vote was taken in the Town Council, in which, we are informed, he would have had a majority. We may congratulate Mr. Booth on the course which he has pursued, and hope he will find at Southport a Gas Committee who will not take a pleasure in badgering their officials.

The Gas Committee of the Corporation of Manchester have been busy investigating all the recent improvements in the manufacture of gas. As regards carbonizing operations, they went to Maidstone, and saw the apparatus of Mr. West. With a view of acquiring a knowledge of the latest improvements in the purification of gas, they went to the South Metropolitan Gas-Works, and there saw Mr. Hills's method of purification in operation. We have no doubt they went home perfectly satisfied that the manufacture of gas is an easy process, always considering that it is lightly weighted with novelties. In many places in Manchester, large gas-lights are imperatively required, so we are pleased to find that the Committee extended their investigations so far as to witness for themselves the effects produced by the large burners now in operation in the Waterloo Road and Waterloo Place, Regent Street. Circumstanced as the Gas Committee are, with an enormous profit, they can do nothing better than apply what they have seen to the better illumination of their city. Let them, for example, do in Market Street, from the Infirmary to the Exchange, what has been done in Waterloo Place. The result will be a far greater boon to the ratepayers than the expenditure of gas profits in the erection of a new town hall.

THE SELECT COMMITTEE ON LIGHTING BY ELECTRICITY.—The Committee appointed by the House of Commons "to consider whether it is desirable to authorize municipal corporations or other local authorities to adopt any schemes for lighting by electricity; and to consider how far, and under what conditions, if at all, gas or other public companies should be authorized to supply light by electricity," held their first meeting last Thursday, when Dr. Lyon Playfair was elected Chairman, and Tuesdays and Fridays were fixed for the days of meeting. The inquiry will commence on Friday, the 25th inst., at twelve o'clock, when Professor Tyndall and Dr. Siemens will be examined.

FATAL ACCIDENT AT THE DUNFERMLINE WATER-WORKS.—On Wednesday forenoon an accident occurred at the Dunfermline Water-Works in the Devon Valley, by which one man lost his life and another was badly injured. The men in question were engaged in holding a fall on the face of a steep embankment near the inlet of a culvert, when, without the least warning, the earth gave way, burying both the workmen. They were speedily disinterred, when it was found that one of the men was so seriously injured that he died in a few minutes. His comrade, although badly bruised, was able, with assistance, to walk to the Glensherup huts. Two watchmen were stationed at the top of the embankment, so as to give an alarm should they see any sign of an accident; but the fall took place so suddenly as to preclude the possibility of notice being given.

GAS *v.* ELECTRICITY.—An interesting lecture was given recently at the King's Cross Wesleyan Institute, London, by Mr. J. Coates, Assoc. Inst. C.E., F.G.S., on the relative value of gas as compared with electricity for lighting purposes. The lecturer traced the history of gas from its earliest stages of manufacture up to the present time, and exhibited a number of burners in the room. The electric light was also explained, and various diagrams were hung round the walls, showing the electric lamps of the different systems, comprising the Jablochkoff, Werdermann, Rapieff, Wallace-Farmer, &c. Mr. Coates spoke highly of the example of Mr. Woodall, of the Phœnix Gas Company, in showing what gas really can do, by the establishment of new and better lamps, as exhibited in the Waterloo Road, and also of the lamps in Waterloo Place and Queen Victoria Street by the Chartered Gas Company. The general conclusions went to show that for house purposes gas was far superior to the electric light, even if the current could be divided; the chief reason being that the former was not detrimental to the vision, like the latter. As far as street lighting was concerned, the question simply resolved itself into this: How much light will the ratepayers pay for? He believed the rage about the electric light was fast dying out, and would not be revived for another quarter of a century, if then. The lecture was well attended, and much appreciated by the audience.

Water and Sanitary Notes.

We do not learn that any progress has been made towards the appointment of the Royal Commission on National Water Supply, as suggested in a letter from the Society of Arts, to which the Prince of Wales put his name. The Government perhaps think that we have had enough of Commissions on Water Supply, and do not care to burden the public with another bulky Blue-Book, which very few will read, and from the contents of which nothing will result. If the country is to be divided into water areas, a competent Engineer, with the Ordnance maps before him, can do it in a month. No Royal Commission is required to do this work. But, the water areas being settled, how is the distribution of their yield to be effected? The towns are all provided, thanks originally to commercial enterprise. But how are the villages, from which no remunerative water-rates can be obtained, to be supplied? The fact is, they are not in want of a supply. The wells in close contiguity to most cottages afford an ample quantity of water, from the use of which no harm is alleged to arise, except by doctors and chemists who pretend to knowledge which they do not possess. The rural population of this country is, as a rule, healthy. All the reputed centenarians are to be found in villages where they have drunk what is called polluted water all their lives. The wells in villages must be maintained, but when these are scarce, as they often are, the parish authorities can do nothing better than keep the brooks and ditches in proper condition.

We are sorry to say that the undertaking of what we suppose we must call the Colchester Water-Works Company is practically sold to the Corporation—or, in other words, the Urban Sanitary Authority of the district. The terms of the purchase will have to be settled by arbitration; but it will be easily seen what these terms are. Twenty-five years purchase of the net earnings for the year ending June 30, 1879, with ten per cent. for compulsory purchase, are the terms upon which the Company have agreed to sell, and the Corporation have agreed to buy. The Bill which the Company are promoting this year is not to be taken into account in the arbitration. It appears to us that all the arbitrators will have to determine will be the amount of the net earnings for the above-named year, and, upon that basis, to assess the value. The stock of main-pipes, coals, &c., of the Company are to be taken over at a valuation. When this transaction is completed, another water undertaking will have disappeared from commercial circles. It is a fact to be greatly regretted, and Colchester will never be one whit the better for it. The ratepayers will probably pay enhanced charges, and be subjected to rigid supervision; but they will have the same water supplied to them in the same quantity, and no soul can say that any one will be the better for the transfer. It suits the vanity of the Town Council, however, to undertake the management of the water undertaking, and we must leave them to their fate.

The water-works of the Corporation of Wolverhampton have been very productive in the past year. No less a sum than £3420 is accounted for as the net profits of the year's working. This, for a Corporation undertaking, in a town of the size of Wolverhampton, is far too high a profit to be made, and we are happy to see that this fact is recognized by the Water Committee, who propose, at a not distant date, to considerably reduce the water-rates. It seems that, at the present time, 1s. 6d. in the pound is charged; but before very long the rate will be reduced to 1s. 3d. in the pound, and, further, the charges for extras, such as baths and closets, will be also largely reduced. This is as it should be, and while the Corporation of Wolverhampton proceed in this way, we can conscientiously congratulate them on their success.

The Water Supply of Salford.—The storeage reservoir at Highfield, which has been in course of construction for some 18 months, is now nearly completed. This important work has been undertaken by the Water Committee of the Salford district, who are under a contract with the Manchester Corporation to receive from them a certain quantity of water per diem. The arrangement has proved decidedly advantageous, on the whole, to the Salford district. It is found, however, that the inhabitants do not reap the full benefit of the contract, for on certain days—at the end of the week, for instance, and during holiday times, when the mills and workshops are idle—a considerable proportion of the supply which the district is entitled to, remains unconsumed. It was in order to utilize this residue, and to make provision for the extra demand experienced at certain seasons, that the Water Committee projected the new reservoir, which, with the one already existing at Highfield, will afford storeage-room for about 16 million gallons. The new reservoir adjoins the existing one, and the total cost has been upwards of £8000. The embankment rises 20 feet above the ground level, and is at the base 106 feet thick. Running through each side is a stout puddle wall, and below the ground level a puddle trench 12 feet deep, rendering the embankment at once firm and water-tight. The reservoir is fed from the principal water-main in Liverpool Street, being connected with it by a 12-inch service-pipe, and is at such an altitude that the water can be distributed with sufficient pressure in the district to be supplied.

A TREATISE ON THE SCIENCE AND PRACTICE OF THE MANUFACTURE AND DISTRIBUTION OF COAL GAS.

CLXXVI.

THE TREATMENT OF RESIDUAL PRODUCTS.

Toluidine (C_7H_9N).

This alkaloid, also called amidotoluene, was discovered in 1845 by Muspratt and Hofmann, or, rather, it would be more correct to say that they discovered one of its modifications, now known as paratoluidine. Modern researches have shown that there are three modifications of toluidine—namely, paratoluidine, orthotoluidine, and metatoluidine.

Paratoluidine.—This form boils at about 198° C. = 388° Fahr., according to some of the latest researches. Beilstein and Kuhlberg at one time considered it to boil at as high a temperature as 200° C. = 392° Fahr., and that number agrees with a recent determination made by Dr. Otto N. Witt. The mean of three experiments made by the writer upon a product apparently pure gave 198·70 C.* Its melting point, according to the authors above quoted, is 45° C. = 113° Fahr. The melting point of its acetyl derivative is 145° C. = 293° Fahr. It gives no coloured reaction with chloride of lime and hydrochloric acid.

The literature on the subject of the toluidines is now getting rather formidable, and the writer has not found it an easy task to write a *précis* on the subject which should have the advantages of brevity and clearness. The fact is that the toluidines are becoming more important every day, and it is absolutely necessary that the tar distiller should have a distinct idea of the differences in their reactions, and the methods by which they are prepared.

There are two principal ways in which paratoluidine may be prepared—(1) by the reduction of nitrotoluene directly for the purpose; and (2) by fractionation of the so-called heavy commercial anilines.

Preparation of Paratoluidine directly.—Toluene, boiling as near 111° C. = 231·8° Fahr. as possible, is first to be converted into nitrotoluene. For this purpose Dr. Hugo Müller mixes the nitric and sulphuric acids, and runs the mixture slowly into the toluene, taking care that the action does not become too energetic, as, in that case, dinitrotoluene would be formed. The nitrotoluene, after washing, is to be reduced with iron filings and acetic acid in a similar manner to nitrobenzene, as previously described. The crystals of paratoluidine obtained in this manner may be freed from the adhering orthotoluidine by a washing with that portion of American petroleum or Burmese naphtha which boils between 80° and 100° C. = 176° and 212° Fahr. It is then to be re-crystallized from the same menstruum.

Paratoluidine may also be obtained directly by the reduction of the pure solid paranitrotoluene.

We have recommended that when commercial aniline is rectified in cast-iron stills, the operation should not be pushed to dryness, as, in that case, the stills soon become injured. The portions remaining behind, known as "heavy aniline," "aniline residues," "tailings," and in France as "*queues d'aniline*," may either be mixed with the aniline for red, or be treated for the preparation of the different toluidines. Paratoluidine may be prepared from these residues by the following process:—The fluid is to be fractionally distilled to separate those portions which boil at or near the boiling point of the toluidines, remembering that if the rectifications are insufficient, much trouble will be found in the subsequent operations, owing to the presence of the other bases, which we have already mentioned as existing in the least volatile portions of commercial anilines. When the rectifications have been carried so far that a product is obtained distilling at about 200° C. = 392° Fahr., it is to be converted into oxalate. The oxalate of paratoluidine is less soluble than the corresponding salt of orthotoluidine; 100 parts of water at 14° C. = 57·2° Fahr., dissolve 0·87 of oxalate of paratoluidine; and 100 parts of water at 21° C. = 69·8° Fahr., dissolve 2·38 of oxalate of orthotoluidine. On decomposing the oxalate with caustic soda, the paratoluidine (mixed with some ortho and metatoluidines) separates, and is to be distilled. The crystals may be drained, washed with water, pressed, and re-distilled. If the other modifications of toluidine be present in sufficient quantity to retard the crystallization of the para variety, exposure to a low temperature will much facilitate the separation.

Metatoluidine.—This modification was obtained by Beilstein and Kuhlberg by treating the metanitrotoluene discovered by them with tin and hydrochloric acid. Its boiling point is given by them as 197° C. = 386·6° Fahr. Its specific gravity is 0·998 at 25° C. = 77° Fahr. Its acetyl derivative melts at 65·5 C. = 149·5 Fahr. It gives a violet colouration with chloride of lime and hydrochloric acid.

Metatoluidine is contained in commercial "anilines for red," and in the ordinary liquid toluidine of commerce. It may be obtained from the latter, according to Wroblevsky (*Journal of the Chemical Society*, July, 1871, p. 563), by heating it with rather more than the theoretical quantity of glacial acetic acid for 16 hours. On cooling, the greater part of the product solidified, but a considerable proportion of toluidine remained uncombined. On distilling it off, and again subjecting it to the same treatment, the product solidified after three days rest, and consisted of pure metatolylacetamide. The crude product, as separated by distillation, had the same degree of solubility as metatolylacetamide, and its derivatives were wholly distinct from those of paratolylacetamide, and were of great beauty and purity.

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* There is a misprint in the article on boiling points at p. 511 of this Journal. Right-hand column, line 13 from bottom, *for* 298·6° *read* 198·6°.

Metatoluidine may be obtained from metatolylacetamide, prepared as above, by distilling it with alcoholic potash.

Orthotoluidine.—This variety (the pseudotoluidine of Rosenstiehl) is produced by the reduction of the liquid form of nitrotoluene. It appears to have the same boiling point and specific gravity as metatoluidine. It remains liquid at − 13° C. = + 8·6° Fahr., according to Beilstein and Kuhlberg, and even as low as − 20° C. = − 4° Fahr. according to Rosenstiehl. It boils at 197° C. = 386·6° Fahr., and therefore at the same temperature as metatoluidine. Its acetyl derivative melts at 107° C. = 224·6° Fahr., and, like metatoluidine, it yields a violet colouration with chloride of lime and hydrochloric acid.

We are now in a position to understand the nature of the so-called "anilines for red," which are, in fact, commercial toluidines containing aniline. Aniline for red is really a mixture of aniline with para, meta, and orthotoluidine. On cooling a commercial toluidine boiling at 198° C. = 388·4° Fahr. to 0° C. = 32° Fahr., it will deposit crystals of paratoluidine; but on draining off the crystals, and re-distilling the liquid portion, its boiling point will be found unaltered. This will readily be understood from what we have already remarked upon the boiling points of the three toluidines.

The following boiling points of a good aniline for red will give an experimental confirmation of what has been said as to the composition of this product:—

Boiling Point of a Commercial "Aniline for Red."

	T.	*t.*	N.	Corrected Temperature.
	Deg.	Deg.	Deg.	Deg.
10 per cent., at	188	18·75	118	191·1
20 „ „	189	18·75	119	192·1
30 „ „	189·25	18·75	119·25	192·4
40 „ „	190	18·75	120	193·2
50 „ „	190·5	19	120·5	193·7
60 „ „	191·25	19	121	194·5
70 „ „	192·5	19·5	122·5	195·8
80 „ „	193·75	19·5	124	197·1
90 „ „	196	19·5	126	199·4

As the boiling point of aniline is 182° C. = 359·6° Fahr., and that of an ordinary mixture of the three toluidines may be assumed at 197° or 198° C., we see at once, from an inspection of the above table, that it represents the composition of a mixture of aniline and the toluidines. No reliance can be placed upon the reading against the first 10 per cent., as there is always a certain amount of moisture present. If, therefore, we commence the readings at 20 per cent., we see that the so-called aniline for red begins to boil ten degrees above the boiling point of aniline.

Although the boiling points, as given in the above table, represent those of an aniline for red which gave excellent results, it must not be supposed that it would satisfy every buyer. It should be remembered that a mixture such as we have described is not generally made by mixing pure aniline with toluidine in various proportions. It is more usual to make them from benzoles containing more or less of the homologues of that hydrocarbon.

Commercial anilines for red vary much in composition; they are often designated "light" and "heavy" anilines. The words "light" and "heavy" are here used not with reference to their specific gravities, but only with regard to boiling point. Thus, an aniline of comparative purity is called light, and one consisting chiefly of toluidine is called heavy, yet the density of aniline is 1·020 and that of the liquid toluidine 0·998. The densities of commercial anilines vary with their composition—*i.e.*, with the relative proportions of aniline and toluidine present. Thus a so-called light aniline will have a specific gravity of about 1·010, and a heavy aniline will vary from 1·004 (the mean between the densities of aniline and liquid toluidine) to 1·007. It was usual with most makers of aniline for red, and is still so with many now, to prepare it from a 50 per cent. benzole, and the resulting product had a density of 1·009 to 1·010. An aniline of this class yielded on distillation about 50 per cent. below 190° C. = 374° Fahr. (uncorrected). An aniline of this class used to be preferred by some of the principal German manufacturers of magenta. It will be seen on reference to the boiling points of the aniline for red given in the table, that it would appear to have been made from a naphtha containing about 50 per cent. of benzole, because it contains 50 per cent. boiling at 190·5° C. (uncorrected), and the principle of correcting boiling points for that portion of the mercurial column of the thermometer not immersed in the vapour, has not yet made its way into the laboratories of many tar distilleries, although it will probably do so in time. There are magenta manufacturers who prefer an aniline made from 30 per cent. benzole, which the writer is informed gives an aniline yielding on distillation about 30 per cent. at 190° C. (uncorrected); but, if this be true, it would appear that a benzole of 50 per cent. and one of 30 per cent. yielded anilines of nearly the same character, for we find in the table opposite 30 per cent. 189·25 as the value of T. (or the uncorrected boiling point); but it must be remembered that entire consistency is not to be expected in the boiling points of mixtures of more or less uncertain composition such as these.

Some manufacturers of magenta prefer an aniline giving 95 per cent. at 198 C. (uncorrected) = 388·4 Fahr., while others insist upon 95 per cent. at 205° C. = 401° Fahr. An aniline of this character has been prepared by the writer from aniline recovered from magenta making. It was obtained by using the homologue separator, as described at p. 150 of the present volume of this JOURNAL.

From what has been said, it will be seen how difficult it is to pronounce upon the best possible quality of an aniline for red; especially *by a mere determination of boiling point.* Some manufacturers prefer anilines of the highest obtainable boiling points, others seem to be returning to comparative low ones, while others rely upon anilines lying between the two extremes. The truth probably is, that although the boiling point should be even higher than that given in the table, the real secret consists in a proper adjustment of the quantities of the different forms of the toluidines. For this purpose a means is required of enabling the aniline manufacturer to separate rapidly, accurately, and cheaply the three varieties.

Some years ago, the writermade an attempt to determine the best kind of mixture for magenta. He offers the results with much reserve, as, while the paratoluidine was pure, the orthotoluidine, although purchased as pure, was not analyzed, and probably contained some paratoluidine and metatoluidine, but in what quantity is not known. The melts were made with arsenic acid with great care. The results are given in comparison with a melt obtained from the finest specimens of commercial aniline for red which the writer has yet seen; the value of which, as a magenta-yielding product, is taken as 100 for a standard. All the experiments were made by printing the trial melts against the standard.

1. Paratoluidine alone gave a dirty scarlet colour, but no magenta. 2. The so-called orthotoluidine alone gave on printing a colour equal to 50 parts of magenta; this shows that it was not pure, as Rosenstiehl has shown that his pseudotoluidine (orthotoluidine) gives no red compound when heated with arsenic acid; but a mixture of it with paratoluidine yields a large quantity of magenta. He also states that a mixture of orthotoluidine and *aniline* treated with arsenic acid yields a large quantity of a red colouring matter resembling fuchsine, but distinguished from rosaniline salts by the solubility of its base in ether, and other characters. 3. Two parts of the impure orthotoluidine, and one part aniline, gave a shade equal in depth to 30 parts of magenta; but the product was very poor and yellow. 4. Paratoluidine two parts, and one part of pure aniline, gave a red shade equal in depth to 33 parts of magenta. 5. Orthotoluidine four parts, and paratoluidine one part, gave a print equal to 90 parts of magenta. 6. Orthotoluidine two parts, and paratoluidine one part, gave a print equal in depth to the standard—*i.e.*, 100 parts of magenta. 7. Orthotoluidine three parts, and paratoluidine one part, also gave a print equal to the standard. 8. Equal parts of the impure orthotoluidine and pure paratoluidine gave a shade equal in depth to 66 parts of magenta.

The writer, while again admitting that the uncertainty attending the composition of the so-called orthotoluidine used by him is to be regretted, would suggest that one inference may be drawn from the above experiments—namely, that those manufacturers of magenta who insist upon the highest boiling points of the so-called anilines for red are in the right; and as ortho and meta toluidine boil at 197° C., and paratoluidine between 198° C. and 200° C., the mixture for magenta should contain a considerable proportion boiling between those temperatures.

Communicated Article.

GAS AS FUEL.

IV.

By "ISCA."

Warming apartments is a matter in which individual tastes and prejudices are so mingled with considerations of scientific fitness and economy, that any attempt to deal with it upon the latter bases, without reference to the former, would be attended with failure. It has been demonstrated over and over again, *ad nauseam*, that the English custom of heating rooms by an open fire of coal, in a grate more or less built into the wall, is a grossly extravagant one, and the best reasons have been given, and perfectly unanswerable arguments used, in behalf of stoves of different construction, without altering the system to any appreciable extent. It is true that any improvement in the design or construction of the open grate and its appurtenances is generally appreciated, as may be abundantly proved by reference to the difference between grates after the fashion of even ten years ago, and the most fashionable models of the present time. But the deeply-rooted affection for an open fire is not, with the general public, in the slightest degree modified; and as long as the cheerful flickering coal blaze is so cherished for the sake of its appearance, as well as for the clear radiant heat it affords, it will probably retain its position in public esteem, until fuel suitable for it shall become so costly as to lend vastly-increased weight to the economic side of the question. There is a certain foundation of truth for the preference shown for an open fire over any system of heating air by pipes or flues, which we will now proceed to discuss and estimate at its probable value, for future guidance.

The heat given out in a room by an open fire is radiant only as distinguished from that obtained from the distribution of heated air, or by conduction in any other manner. Any device for producing the same effect by means of gas must, therefore, act by the same means, for the warmth so derived affects in a peculiar way the human body which is subjected to its influence. Radiant heat is the same as that derived from the sun direct; and the brightness and exhilarating effect of a clear sunny day, when its existence is most fully manifested, has only to be compared with the languor and depression experienced in cloudy, sultry weather, when the atmosphere has been heated by contact with a parched earth, for the mind to be convinced of its superiority, although the reasons for it may not be understood. Briefly stated, air is not affected by radiant heat, so that heat-rays pass through it to the cold object which attracts them, without suffering loss of power; a human body, therefore, feels comfortably warmed by them while breathing air quite cool and refreshing. This curious property accounts also for the "rawness"

of the air so frequently complained of in spring, when the sunshine feels quite hot. And it is a provision of great beneficence for the inhabitants of the globe; for if the atmosphere were capable of being directly heated by the sun's rays, it would attain the withering temperature of a blast-furnace; while the rush of colder air from those portions of the earth's surfaces which happened to be in shadow, would cause hurricanes so violent as to render life impossible, even if the heat could be endured.

Now, the difference between the sensation experienced by the human body in a room warmed by the radiant heat of a coal fire, in contrast with that produced by previously heated air, is this: In the former case, the body receives warmth from the fire, and the walls of the apartment, being subject to the same influence, do not attract an undue amount of heat from the body. The body, therefore, is only cooled by the contact of air, which, from the property before mentioned, is cooler than the walls, &c., of the room. Now, under ordinary circumstances, this cooling agency is very limited in its action; and as, for equal differences of temperature between (*a*) bodies exposed to radiation, and (*b*) bodies exposed to contact of air, the thermal change is greater in the former than in the latter, it follows that when both are in operation at one time, as in the present instance, the balance is in favour of the heating influence, and the body is accordingly at ease.

On the other hand, when the air is hotter than the walls, the circumstances are entirely reversed. The walls and other objects in the apartment now abstract heat from the body, which only receives warmth from contact with heated air; and, from the comparative feebleness of air in imparting heat, which is commensurate with its power of abstracting it, as in the former case, it is necessary, in order to counteract the loss of heat by the body to the walls, &c., that it should be raised to such a temperature as to cause, by its consequent rarefaction, an unpleasant amount of labour in the respiratory organs. Hence the preference shown to systems of heating apartments intended for human occupation, by direct radiant heat, or such modifications of it as may tend to secure its most important characteristic of warming objects in a cool atmosphere.

However objectionable it may be to introduce hot air into places in actual human occupation, it is perfectly allowable to warm the walls, &c., by contact of heated air, previously to their being inhabited, and then providing cool ventilation. This may well be done in public halls, churches, &c., which are only occasionally used. The advisability of such expedients for supplementing direct radiation is evident when it is remembered that only about half the heat of incandescent fuel is radiant, the remainder being carried off by the products of combustion, including the air drawn into the chimney. In an ordinary room a small proportion of this is doubtless absorbed by the chimney breast, and thence given off into the room; but its value is small.

If the necessity of utilizing the heat of the fire, other than that which is radiant, is apparent in the case of solid fuel, much more is it so in treating of gas. In fact, when gas is burned under those conditions which develop its heating energy in the most complete degree—that is to say, by previous admixture of air, as in the Bunsen burner—the amount of heat radiated is extremely small, almost the entire effect being concentrated in the flame itself. Hence, in dealing with the question of warming rooms, &c., with gas, we are met at the outset with the difficulty, that its peculiar nature renders its action least directly efficacious for the required purpose exactly when its inherent power is most conspicuously exerted.

The real object to be attained by all gas-stoves intended for heating purposes direct, as distinguished from those constructed for heating water-pipes, &c., is to transform the heat of the flame into radiant heat—a problem which should not be insoluble. This, of course, is a very different thing from merely reflecting the radiant heat actually developed by burning gas in the usual way, as for light. That is really only making use of a fraction of the possible energy in the true direction. What is wanted is, first of all, to get all the work possible from the material, and then dispose of it in the proper manner.

In some European countries where the winter is extremely rigorous, houses are warmed throughout at an expenditure of fuel which would scarcely maintain for one hour the open fire in an English drawing-room. This assertion has been made so often, that, as was observed in the beginning of this article, it is trite and disregarded. But the means whereby that effect is produced may throw a light upon the question at issue, and, if so, it may be well to try yet once more to teach an acceptable lesson from other people's example. In every room stands an earthenware stove, which, from its size and appearance, is often the most important article of furniture in the apartment. Often it is of fine porcelain, beautifully modelled and coloured—a veritable work of art as well as of great utility. When the exterior temperature is at about zero, a handful of lighted charcoal is put into the stove, and the heat therefrom is given out with mild radiance from every part of the structure, the power of porcelain, in this respect, being superior to that of iron or copper, while there is a total absence of any objectionable smell like that of heated metal. Its height being great, the flue adds considerably to the total effect, as the products of combustion pass away at a very low temperature. The fuel burns very slowly, and, consequently, for bed-rooms or halls, where little attention is possible, there is not much danger of the fire going out, which is an advantage that must be allowed to this system by the strongest advocate of the open grate, and is something which may also be claimed for gas, to an unrivalled degree. And it appears feasible to conduct, by suitable appliances, the heat of a Bunsen burner to the surface of stoves of similar construction to these, for charcoal, and so to obtain the nearest possible approach to radiant heat, without the necessity of exposing actually glowing fuel.

Without pretending to lay down the detailed design of heating-stoves upon this principle, it may safely be stated that there is room for experimental research into the efficiency of apparatus built upon the lines above indicated, of complete combustion, careful transmission, and ample area for radiation; and it is probable that the earthenware stove of great height will be found to give more satisfactory results than any other model.

In heating greenhouses and conservatories, &c., which are commonly built in chief part of glass, and are not primarily intended for human habitation, another and simpler question is presented for solution, and consists almost solely of the necessity of heating the contained air, and that which finds its way into the interior through the crevices of doors and windows. The walls are, in such cases, incapable of storing heat, and the cooling influence they exert is simply by means of conduction to the exterior—a process capable of tolerably accurate estimation. Hot-water pipes are almost universally employed as the agents for maintaining the required temperature of such places, and are so arranged in a circuit that the water, having become cooled by the distribution of its heat, returns to the boiler for a renewal of its energy. The problem is thus resolved into a matter of heating a certain weight of water through a range which is usually limited by the fact that, while the water must not be allowed to boil, it should not be cooled much below 170° Fahr., in order to take advantage of the superior distributing power of pipes at high temperatures over those at but slight differences between their surfaces and the surrounding air.

We have seen, in earlier portions of this inquiry, that gas is endowed with great power as regards heating water, and its regularity of action, and the ease with which it may be controlled, render it particularly suited for such a clearly defined duty as that of heating a circulating boiler. Coal, or any solid fuel, is very ill adapted for this work, for, in most cases, from the peculiar shape of the apparatus employed, only its radiant heat can be utilized, which is only half the effect it is capable of producing, and a great proportion of that is wasted, while gas can be caused to exert its utmost power under similar circumstances. It will consequently be near the truth if we assume that the comparative performance of coal and gas in circulating water, and the cost of each kind of fuel, will bear about the same ratio as was found in Section III. of this article to obtain in the case of water otherwise heated in small quantities. But there is one aspect in the present question which shows the advantage of gas under conditions which place it beyond the power of any kind of solid fuel to compete with it, and that is the possibility of making good use, by its assistance, of circulating apparatus of the most diminutive proportions, or to reduce the activity of larger systems to a point at which it would be impossible to keep a fire alight without the consumption of so much fuel as to render any attempt at comparison of results entirely supererogatory.

For instance, a 2-inch pipe, at a mean temperature of 190°, in air at 60°, will dissipate 177 units per foot run per hour, which will suffice to raise 9777 cubic feet of such air 1° in that time. Or supposing, for example, that it is required to maintain the interior temperature of a small greenhouse, 12 feet long by 10 feet wide and 8 feet high, at not less than 60°, while the thermometer stands at 50° outside; the loss of heat by such a structure will be for 1° of difference = 0·306 unit per square foot of exposed surface per hour, or for the assumed difference of 10° = 3·06 units; and the superficies being, say, 480 square feet, not including the floor, the total loss will be 1468·8 units per hour by radiation and contact of air. And if we further assume that by leakage, &c., the contained air, = 960 cubic feet, is entirely renewed within the hour—which means that 960 cubic feet of air have to be raised in that time from 50° to 60°, or an additional requirement of $960 \times 10 \times \cdot238 = 2284{\cdot}8$ units (the last factor being the specific heat of air)—adding the two, we shall have 3753·6 units to supply per hour, which would require, as above, nearly 22 feet run of 2-inch pipe, and the necessary heat would be produced by the consumption of 5·4 cubic feet of gas. Allowing full value to every source of waste, the consumption of coal to do an equal amount of work should be not more than about 1 lb. It is palpable, then, that no useful effect could be extracted in practice from such a sluggish combustion, even if it were possible to keep such a small fire going at all.

Examples of this nature might be multiplied to any extent; but enough has been done to show the incontestable superiority of gas, under certain circumstances, as a source of heat, for systems of hot-water circulation.

Before leaving this branch of our subject, we may indicate the use of enclosed hot-water pipes for warming the walls of corridors, staircases, &c., as a convenient means of maintaining a comfortable temperature, similar in character to that of direct radiation, with great economy of force, which may be most conveniently derived from gas.

There is a great future in store for gas as fuel, and many devices will be tried before the best means of using it will be authoritatively decided. But one word of advice may be offered in concluding this article, and that is—let the *effect* required be in all cases clearly understood, and then let the appliances for producing it be intelligently devised. More particularly is this observation intended to apply to heating houses and similar places where the measure of success is judged from a standard of far greater delicacy than a thermometer. Let not mere appearance be a guide, nor attempt to imitate the *look* of a coal fire, without reference to the peculiar work it is capable of doing. Two agents may do the same duty, but not outwardly resemble each other in the least. If one works as well as, or better than the other, it will rival or supersede it on its merits,

and the accidents of its appearance will become familiar and possibly favoured; while the inferior one will never gain acceptance by aping the form of the other. Beauty is never secured when it is sought as an end; but fitness is instinct with beauty, and when the first is attained, the existence of the other is soon perceived and understood.

Correspondence.

[*We do not hold ourselves responsible for the opinions expressed by Correspondents.*]

THE SELECT COMMITTEE ON LIGHTING BY ELECTRICITY.

SIR,—Whatever report the Committee appointed by the House to consider this question think fit to make, the evidence of such men as Professor Tyndall and Dr. Siemens, with, doubtless, several others of the same class to follow, cannot fail to be of the very first importance to gas companies.

It would, therefore, be greatly to the benefit of gas companies generally if some of the more prosperous of them would send up their Engineers to attend the sittings of the Committee, and be at hand to offer any suggestion, or give any explanation on the part of the companies that may seem to be necessary, as the case proceeds.

A room in the Westminster Palace Hotel, or elsewhere in the neighbourhood, might be engaged, for the Engineers to meet and interchange views as the case proceeds. If any companies are willing to act upon this suggestion, I shall be pleased to do all I can to further it.

The Association will watch the proceedings generally, but it will not be possible for them to keep engineers and other professional men in the room, and the evidence will not be published until the inquiry is finished and the report made.

W. LIVESEY.

Gas and Water Companies Association, 6, Victoria Street, Westminster Abbey, S.W., April 21, 1879.

THE USE OF LARGE BURNERS FOR PUBLIC LIGHTING.

SIR,—The subject of public lighting is at present attracting so much attention, that the following results recently obtained here by the use of large burners may be interesting to some of your readers.

The illuminating power of the gas made by this Company on the 9th inst. was 22·7 standard sperm candles, for a consumption of 5 cubic feet per hour in a Sugg's No. 7 steatite bat's-wing burner.

On the same day the following results were obtained from two of Sugg's large new Argand burners:—

First Experiment.

Burner—Sugg's Argand with *two* concentric flames.
Consumption per hour . . . . . 22·2 cubic feet.
Illuminating power . . . . . 103·7 candles.
Or 4·67 candles per foot of gas.

Second Experiment.

Burner—Sugg's Argand with *three* concentric flames.
Consumption per hour . . . . . 40·8 cubic feet.
Illuminating power . . . . . 208·8 candles.
Or 5·12 candles per foot of gas.

I have reason to believe that these are as high, if not the highest results yet obtained per foot of gas from these burners.

WILLIAM KING.

Liverpool United Gaslight Company, Engineer's Office, Duke Street, Liverpool, April 16, 1879.

THE PUBLIC HEALTH ACT (1875) AMENDMENT BILL.

SIR,—This Bill, when first introduced, caused great alarm to water companies; but the promoters, after several interviews with some of the companies, gave notice of certain amendments to be made in Committee, which relieved it of its most injurious provisions, and thereupon it was allowed to pass through Committee unopposed, when the amendments were made as proposed.

The provisions of the Bill now are, that if a company have statutory powers to supply any district or place with water, and do not supply certain parts of it, the local authority may, in writing, require the company to state within two months—1, whether they will consent to the local authority supplying the district; 2, whether they will themselves undertake to supply it; 3, whether they will supply water in bulk to the local authority for the local authority to distribute.

If the company are willing to supply the district themselves, they are to state within what period they will undertake to do so; or, if they prefer to supply water in bulk, they are to state within what time, and on what conditions and price, they will furnish such supply.

If the local authority think that the proposals of the company are unreasonable, either as to time, conditions, or price, they may refer the same to arbitration.

If the company fail to send a reply within two months, or decline to furnish a supply, the local authority are to have the power of furnishing such supply themselves, notwithstanding that the company have such statutory powers.

There is nothing in the Bill as it now stands, to alter the terms, and conditions upon which companies are required to furnish a supply in their own districts. If, therefore, any company undertook to furnish a supply, they would have to do so upon the terms and conditions of their own special Acts.

W. LIVESEY.

Gas and Water Companies Association, 6, Victoria Street, Westminster Abbey, S.W., April 21, 1879.

BRIGHTON AND HOVE GAS COMPANY'S BILL.—At the meeting of the Shoreham Harbour Trustees on Tuesday last, the Committee appointed to watch the progress of the Brighton and Hove Gas Bill in Parliament reported that there had been inserted in the Bill, as amended in the Commons Committee, such provisions as would protect the rights and interests of the Board, and the Committee did not think it necessary to petition against the Bill in the House of Lords.

Parliamentary Intelligence.

HOUSE OF COMMONS.

WEDNESDAY, APRIL 16.

A requisition to withdraw their petition against the Houghton-le-Spring District Gas Bill was presented from the Houghton-le-Spring District Local Board.

THURSDAY, APRIL 17.

Glasgow Corporation Water Bill, Portsmouth Water Bill,—as amended, considered; to be read the third time.

Llandudno Improvement Bill (Lords),—read a second time, and committed.

The Examiners reported that Standing Order No. 62 had been complied with in the case of the London Gaslight Company Bill.

Petitions against the following Bills were presented:—Llandudno Improvement, from London and North-Western Railway Company; West Kent Main Sewerage, from (1) Edward Henry Scott, (2) Erith Local Board, (3) Darenth Valley Main Sewerage Board, (4) Dartford Local Board, (5) Dartford Rural Sanitary Authority.

Requisitions to withdraw his petitions against the Aire and Calder Navigation Bill and the Knutsford Light and Water Bill were presented from the Postmaster-General.

FRIDAY, APRIL 18.

Bills read the third time, and passed:—Pemberton Local Board and Sleaford Water.

Bills read the second time, and committed:—Blackburn Improvement, Morecambe Gas, Over Darwen Corporation, Queenstown Gas, Stratford-upon-Avon Corporation.

Knutsford Light and Water Bill.—Petition for additional provision presented, and referred to the Examiners.

Requisitions to withdraw their petitions against the following Bills were presented:—Blackburn Improvement, from Owners and occupiers of land and ratepayers of Little Harwood; Colchester Water, from the Corporation of Colchester.

THE INCIDENCE OF RATING FOR SANITARY PURPOSES.

Mr. ALEXANDER BROWN, pursuant to notice he had given that, on going into Committee of Supply, he would call attention to the incidence of rating, for certain sanitary purposes, under the Public Health Acts of 1875 and 1878, and move—"That a Select Committee be appointed to inquire into the incidence of rating for water supply and sewerage, and report what amendments, if any, it is advisable to make," said that the existing incidences of taxation for sanitary purposes, as was shown by the inquiry held before the Select Committee on the Public Health Amendment Bill last year, worked unjustly in various localities, and seriously interfered with the carrying out of much needed works for the disposal of sewage and the improvement of water supply. The system of special drainage districts, for some reason or other, had not been largely adopted in the rural districts of the country. It had failed to be a great success, on account of the difficulties which stood in the way of the formation of special drainage districts, and which were encountered after their formation. It was not at all wonderful that these districts, hedged round as they were by many difficulties, both in their formation and afterwards, had not become popular. In urban districts, he believed, there was a power to make separate assessments upon different parts of them, but no such power existed in the case of rural districts. If the power to which he referred acted beneficially, why should it not be extended to rural districts? The question, he thought, might with advantage be considered by the Committee for which he asked. It was sometimes stated that if the parish were not taken as the area for sanitary work, no such work could be done; but he contended that the necessary sanitary works were now carried out under the existing system. He thought that some means should be devised by which those who benefited by any improvements with regard to water supply or drainage should bear the cost of them. Those who urged that the parish must be treated as the unit for purposes of rating should, he thought, make out a stronger case than that which they put forward at the present time. With reference to the question of the remedy which should be introduced to improve the existing state of things, the Committee appointed to consider the provisions of the Act of 1878 recommended that, as regards water supply, the cost of all necessary works should fall upon the persons benefited. He maintained that the same principle was applicable to drainage works. If the cost of drainage works were to fall upon those who derived benefit from them, he believed that the opposition aroused in villages by a proposal to introduce improvements would be greatly diminished. The view that the cost of water and drainage works should fall upon the beneficiaries was not altogether a new one. The principle involved was followed in connection with the removal of nuisances, and was found in some provisions of the Public Health Act and in various local Acts. In illustration of this proposition he stated that, in the case of Liverpool, there were local Acts under which the cost of drainage works was imposed upon the property benefited thereby, and not upon the community at large. In other parts of the country this principle had been adopted as part of the local legislation, and he saw no reason why, the principle being admittedly sound, it should not form part of the general law concerning public health. He, therefore, in no spirit of opposition to the Government, but with a simple desire to promote the public health, proposed, as an amendment to the motion to go into Committee of Supply, the motion given above.

Sir B. LEIGHTON seconded the amendment. He said he considered an alteration of the law was needed, for the reason, among others, that at present the charges for drainage weighed very unequally upon owners of house property; those who laid out money on their holdings having to pay as much *pro ratâ* as careless and improvident landlords. The consequence of the present state of affairs was that there was a very strong feeling of injustice, and, in many cases, of virtual stoppage of improvements. He maintained that, in former years, there was very little principle underlying these rates, although lately there had been what he might describe as more accuracy. The principle of the incidence of rating was a haphazard one. He entirely denied that this was a question between town and country. There was hardly a rural district in England where they did not find another population living in the villages besides the agricultural labourers. There were mining populations and others, people engaged in staple manufactures, like the shoe and straw trades, who were altogether separate from the agricultural population. This was a question of getting necessary improvements made, and those improvements could not be made without an alteration in legislation. He trusted the House would not refuse to appoint the Select Committee.

Mr. WHITWELL observed that in certain localities private arrangements existed whereby a small area was exempted from the taxation which fell on all the district around, simply because some centuries ago there was a reason for such exemption, which reason was now entirely removed. Sooner or later these exemptions must be dealt with, or included in an inquiry. He cordially supported the amendment.

Mr. SCLATER-BOOTH said that in his judgment the House would do well to pause before it embarked on so extensive a subject as the honourable member had brought forward. It was no doubt a fact that the Public Health Act of 1875 was by no means a final measure. He did not propose it in that sense. He was quite aware that it was capable of amendment, and that it must be improved from time to time. The formation of special drainage districts was continually going on, and in the six years ending with 1878 no less than £680,000 was borrowed by rural sanitary authorities to be expended on sanitary improvements. There was a general disposition throughout the country to recognize the common liability and responsibility of ratepayers for the welfare of the poorer population, and there was a readiness to accept the obligation, which, after all, was made comparatively light, by means of borrowing and repayments. The value of land was enormously increased by drainage operations, for the construction of sewers benefited, not only the houses drained, but the land of the whole district. He was willing to admit there was something in what had been said. If rating for water supply were separated from rating for sewerage, there was a good deal to be said for rating the consumers of water differently from those who were benefited only by its use for sanitary purposes; but the injustice which might have resulted from a general system of rating was remedied by an Act passed last year, which came into operation only a month ago, so that it was rather too soon to re-open the question now. There were particular cases in which a house-tax of a limited amount might be brought in in aid of the rates, and he would be willing to take the responsibility of making a proposal, when Parliament had a little breathing-time, to discuss some of these local questions, which unfortunately it had not had during the last two or three years. But the question was not so pressing and urgent as to justify him in dealing with it now. He could not separate this motion from a wider Bill introduced by the honourable member, to whom he would put it whether it would not be more desirable to drop the subject for this session, and re-introduce it on a smaller scale next year. The proposal, if adopted, would in many cases be antagonistic to the object he had in view. The House would probably be of opinion that attention had been called to a very important and difficult subject; but it was one which was not lost sight of by his department or himself.

The amendment was negatived, and the House went into Committee of Supply.

HOUSE OF COMMONS COMMITTEE.

THURSDAY, MARCH 20.

(*Before Mr.* ASSHETON, *Chairman*; *Mr.* W. E. PRICE, *Lord* C. BRUCE, *and Colonel* DRUMMOND-MORAY; *Sir* J. DUCKWORTH, *Referee.*)

BRIGHTON AND HOVE GAS BILL.

Mr. RICHARDS, Q.C., and Mr. MICHAEL, Q.C., appeared for the promoters; Sir E. BECKETT, Q.C., Mr. LITTLETON, Q.C., and Mr. PEMBROKE STEPHENS for the Corporation of Brighton; Mr. O'HARA for the Shoreham Harbour Trustees; Mr. WILLOUGHBY for the New Shoreham Local Board; and Mr. GRANVILLE SOMERSET, Q.C., for the Hove Commissioners, petitioners against the Bill.

Mr. RICHARDS, in opening the case on behalf of the promoters, said the Bill originally contained certain clauses, popularly known as the electric light clauses, but those had been struck out, so that it was presented as a simple measure to obtain powers for raising further capital and acquiring additional land, in consequence of the very great increase of business at Brighton. The Company were originally established in 1825, under a trust deed, and they obtained their first Act of Incorporation in the second year of Her present Majesty's reign, which was followed up by two other Acts of the 6th and 17th Victoria respectively. That was the history of the Company up to 1866, when their capital consisted of £100,000 original share capital, and £20,000 borrowing powers. By an Act, passed in 1866, the Company increased their share capital by £75,000, and obtained £25,000 additional borrowing powers. By a Provisional Order, obtained in 1875, their capital was again increased by £50,000, and their borrowing powers by £12,500; consequently, their full share capital was now £225,000, and their borrowing powers were, in the aggregate, £57,500. Of those borrowing powers they had raised all but about £7000 of their capital of £225,000 they had raised and expended £187,500, or thereabouts; but they might be considered at the present moment as penniless, because, although they had not actually called up and spent the whole of their £225,000, they contemplated the erection of additional retort-houses and works, which would leave them, if they waited till next year, without a penny. Therefore, they were only exercising a wise and ordinary precaution in applying to Parliament at once for additional capital as well as land. Presuming that every one knew Brighton more or less, it need hardly be said that it was a place where houses were continually increasing, and where the business of the Gas Company was constantly increasing also. The Committee would not, therefore, be surprised to find that the Brighton and Hove Company had spent their large capital, and now required more. The works of the Company were originally situated very near the site of the old cricket ground—viz., close to Hove Church. As Brighton increased in the direction of Hove, the works, standing in the rather fashionable part, were voted a nuisance, and, consequently, the Company found it necessary to remove them to a somewhat outlying territory, where they had an arm of the sea—New Shoreham Harbour—between their works and the mainland. A more suitable spot for gas-works could not have been chosen; but the necessity of removing to that site had in itself been a very considerable expense, and would account for a portion of the capital which had been raised. Their land was not quite all occupied at present; but it would be as soon as the new retort-house was erected. The capital sought to be raised by the present Bill was £250,000, the dividend on which was to be limited to 7 per cent.; or if it should be issued in the shape of preference stock, to 6 per cent. Two of the petitions presented against the Bill were directed to the large amount of new capital asked for. It was admitted that £250,000 was a large sum, but it must be borne in mind that the Company had introduced the auction clauses into the Bill, and if such clauses had any advantage at all, it was that they removed from the Directors of any company the imputation of raising unnecessary capital for the mere purpose of paying a high dividend on such capital if not wanted. The allegation used often to be made against Gas Directors—but was never once proved—that, inasmuch as they had surplus profits which, if properly applied, under the Gas-Works Clauses Act, would compel them to reduce the price of gas, they preferred to employ those profits in issuing capital not really required, and making extensions of works not really necessary, in order that the surplus profits might be used as dividend upon capital so unnecessarily called up; but under the auction clauses it was impossible to suggest any such motive. A company requiring fresh capital must now put their shares up to auction, and must communicate the price under seal to a public functionary, and then sell to the highest bidder. If the Directors were able to give any benefit to their old friends, the previous Shareholders, it might be an inducement to them to put out unnecessary capital; but when the shares were offered to the world at large, such an inducement disappeared. Lord Redesdale had suggested that it might be a satisfaction to some of the opponents of the Bill if the Company were to undertake not to expend in any one year more than £25,000, and that undertaking they would give. The promoters had been compelled to make an enormous number of applications to Parliament in the course of a few years, and it was very desirable that they should not have to do so again for some years to come, but that they should have a rest. Another reason why the Company asked for a large sum was, because they had been compelled to contemplate the construction of works, the cost of which might be very great, and which it was impossible to estimate. The sea in the neighbourhood of the gas-works had made considerable encroachments, and the Company stood in very serious danger of having their works swept away, unless efficient steps were taken to prevent the encroachments of the sea. The groynes that were built were very small; but efficient ones were very expensive to make, costing from £800 to £2000 each. The land proposed to be taken was claimed by two opposite parties, neither of whom would object to sell if he was satisfied as to the proper ownership; but it would be obviously unsafe for the Company to purchase it from either one of them, lest they should subject themselves to an action at the hands of the other. They, therefore, sought for compulsory powers over the land, so as to convert it into money, and let that money abide the result of any litigation or arrangement between the disputants. The Company also sought for power to make quays, &c., in Shoreham Harbour; and although the Harbour Trustees had instructed his friend, Mr. O'Hara, to appear, he believed he was justified in saying that, if no arrangement had actually been arrived at, it was very likely to take place shortly.

Mr. O'HARA said that was so.

Mr. RICHARDS said that the next power they sought for was an easement over certain lands running parallel with Shoreham Harbour. They wanted to have an easement to lay a large gas-pipe, and also to lay down a waterway, the water supply at the works having practically failed. They had already, under a previous Act, an easement over the same land for gas, and they required the same for water, but no difficulty was apprehended in that respect. The water-pipes were there at present, but it was by agreement, which would shortly expire, and it was hardly a condition for a large company to be left in, to be dependent upon the permission of any one, however willing the owner might be, for the supply of so great a necessity as water. The price charged for gas by the Company in Brighton and Hove was 3s. 6d., which was extremely low—as low, in fact, as the price in London—and it was to be regretted that the Corporation, who might be supposed to represent the cream of the educated intelligence of Brighton, should have complained, among other things, of the price being excessive. That allegation could only have been put into the petition as a matter of form, and they could hardly be serious about it. In some of the outlying districts, as in Portslade and the Upper Shoreham Road, they charged 4s., and in Old Shoreham and Lancing, 4s. 6d.; but there could be no objection raised on that score, as the expense of supplying these outlying districts was naturally greater. The illuminating power was equal to 14 candles, which was the usual provincial standard, but the Corporations of Brighton and Hove could demand 15 candles on the payment of an extra 3d. per 1000. The Corporation of Brighton, in their petition, complained that the illuminating power of the gas was deficient, but that complaint again seemed to be only formal, because the Corporation had recently reduced the supply of gas to the public lamps from 5 cubic feet to 4, besides enlarging the interval between the lamps; and a corporation could not pay a higher or more delicate compliment to a gas company than that. It was an acknowledgment of the excellent quality of the gas. With reference to the petitions presented against the Bill, the force of many of them had been greatly diminished by the withdrawal of the electric light clauses. The first petition was that on behalf of the Corporation, and, in reference to some of its complaints, the Company said that they did not propose to make the slightest alteration in the illuminating power, and that the clause enabling them to sell or let on hire stoves and other heating apparatus, was one which would tend to an increased consumption of gas, if people became aware how easily and comfortably they could warm their houses by the use of gas-stoves, without the excessive filth of coal dust, and so on. It was supposed that if the Gas Company had greater facilities for letting out or selling gas apparatus in the shape of stoves, the effect would be to encourage their trade, and benefit, not only themselves, but the public also, and there was doubtless something in that. It could be easily understood that the dealer in gas-stoves might not like it, but that was a thing all persons were exposed to. With regard to one of the allegations in the Hove petition, the Company did not seek to violate the spirit of the late Act. They did not intend to manufacture gas in Hove, but simply set up a shop for the manufacture and sale of gas-fittings, stoves, and so on; and when the Committee heard the facts, they would doubtless say that it was absurd that the Company should not be able to purchase land for such a purpose. That would in no way depreciate the value of adjoining land for building purposes, and upon that point he might say that the additional lands they sought to acquire were really separated from the mainland by the broad arm of Shoreham Harbour. No doubt the south-west winds would carry the smoke within the limits of the parish of Hove; but the present works were a mile and a half from the town, and that could scarcely be advanced against the extension of the works, which had really become necessary to meet the demands made upon the resources of the Company. It was said that Hove was gradually growing west, and assuming that to be so, the demands upon the Company were likely to be increased. The works were situated at a breezy spot where they were not likely to cause any nuisance. Surely it was better that the present works of the Company should be enlarged, than that they should be driven to seek a site elsewhere, which, as time rolled on, would be open to the same objections as were now being raised. With regard to the sale of gas stoves and fittings, a good deal had been said in the petitions upon that point, but it was not at all likely that a trading company would embark their capital in such an undertaking unless they believed that they could make a profit by it. It would, no doubt, be found that the prices of gas stoves and fittings would go down enormously in Hove when the Company's business was started. The petition also alleged that the quality, purity, and pressure of the gas at present supplied was unsatisfactory, and it was submitted that no further powers should be conferred upon the Company, unless proper provision was made in the Bill for the protection of the consumers and the public. But the Bill did not propose to effect any alteration in the quality, price, pressure, or illuminating power of the gas supplied. The next petition was that of the Shoreham Harbour Trustees; but that would doubtless be arranged satisfactorily. There were also petitions by Mr. Vere Fane Benett-Stanford, M.P., and others, and by Mr. J. M. Carr-Lloyd, who had carried on some considerable litigation at the Lewes Assizes with reference to the ownership of the lands, a part of which was proposed to be taken for the purposes of this Bill. Negotiations were, however, pending, and were in such a state that it was hoped an arrangement would be arrived at by which the land would be converted into money, so that compulsory powers might be granted without doing violence to the private individuals who held the land. The Shoreham Local Board, in the next place, said they were very seriously affected by the Bill, and complained of the speculative character of the business in which the Company were about to embark, believing that it would prevent them reducing the price of gas, which they had a

reason to expect under the existing arrangements. That subject had already been alluded to, and he (Mr. Richards) could only repeat that it was very unlikely a trading company would carry on a business at a loss. The last petition was that of owners and occupiers of dwelling-houses within 300 yards of the works at Portslade; but it must be stated that a large number—in fact, the majority—of these people had come to Portslade since the gas-works were erected. The houses in that neighbourhood were small, and the inhabitants were not quite so fastidious and particular as the residents in Belgrave Square. Those petitioners complained of the amount of the new capital to be raised, but surely sufficient protection was given by the auction clauses of the Bill. They also complained that any reduction in the price of gas, to which they considered themselves entitled, would, by the Bill, be indefinitely postponed—an argument which had been already answered sufficiently. The Company had been obliged to spend immense sums in previous applications to Parliament, and it was only reasonable to suppose that now they would ask for powers sufficient to render further applications for some years to come unnecessary. The petitioners also declared that the extension of the works would increase the nuisances which already existed; but Parliament had expressly provided for penalties to be enforced against gas companies who created nuisances, and those penalties were sufficient for all practical purposes. The whole matter, however, would be a question of evidence, and he hoped to satisfy the Committee that the allegations with reference to the nuisances were unfounded, that the demands made by the Company were nothing more than reasonable, and that the preamble of the Bill would be declared proved.

FRIDAY, MARCH 21.

Mr. O'HARA stated that the hopes entertained of an agreement with the Shoreham Harbour Trustees had unfortunately not been realized.

Mr. *James B. Paddon*, examined by Mr. MICHAEL.

I have been Engineer and General Manager of the Brighton and Hove Gas Company for the last nineteen years. The Company was established in 1825, under the provisions of a trust deed. We subsequently obtained various Acts of Parliament. From the time of its establishment up to 1871 the undertaking was carried on in the parish of Hove. After that the works, so far as the manufacture was concerned, were removed to the new site at Portslade, the old site being retained for stores. Our object was to benefit the district, which, with an increasing population, naturally objected to gas-works in their midst. The land has become of more value, and valuable houses are about being constructed close up to the Company's premises at Hove. The prescribed illuminating power by the Act of 1873 was 14 candles, and the standard test burner was the same as that used in London by the Metropolitan Gas Referees. We have had the gas regularly tested, and the result has been reported to the Corporation, and published in the newspapers. The photometrical apparatus is fixed at the Town Hall, nearly four miles away from where the gas is made. The reports of the Analyst show, without exception, that the obligations of the Act of Parliament have always been fully complied with. In fact, we have always taken care to keep on the safe side, and to give an illuminating power beyond what was required by the Act. By the Act of 1873 we were entitled to charge 4s. in Brighton and Hove; but, unless an application was made to the Board of Trade, the price was to revert to 3s. 6d. No application was made to the Board of Trade, and about twelve months after the passing of the Act we reverted to the charge of 3s. 6d. in Brighton and Hove; but in the outlying districts we charge 4s. 6d. and 5s. 6d. We cannot supply those districts at the same price as Brighton, on account of the greater length of mains and the smaller consumption. The present prices in the outlying districts are not nearly so remunerative as Brighton and Hove. So far as the mains, and so forth, are concerned, in Brighton the cost and maintenance is equal to about 2¾d. per 1000; but in the outlying districts it costs us 1s. 6·68d., showing a difference of about 1s. 4d. These differential prices are not high enough, but we are content to allow them to remain as they are. In Brighton and Hove we sell 291 million cubic feet a year; in the outlying districts we sell only 12 million. Under our Act of 1873, the Corporation of Brighton are entitled to have another candle illuminating power, on payment of 3d. per 1000 extra; but they have never asked for it to be put in operation. Our authorized profit, from 1866 to the end of last year, amounted to £192,000; and the amount of profits actually earned was £157,000. Of that £157,000, £132,900 was divided among the Proprietors, and £18,000 remained undivided, which left a difference of about £35,000 between our earnings and the authorized profits. From that, however, I should deduct £6300 profit made on the sale of shares by auction, and carried to the reserve-fund.

Mr. MICHAEL: In reality, there is more than £35,000 due to the Shareholders, leaving out of consideration the reserve-fund, to make up back dividends?

Sir E. BECKETT: How do you mean, that it was due to the Shareholders?

Witness: In order to make up our statutory dividends. In 1866 our deficiency was £2077; in 1867, £4596; in 1868, £2924; in 1869, £1261; in 1870 there was a surplus of £1814; in 1871, a deficiency of £1241; in 1872, £2553; in 1873, £3729; in 1874, £5275; in 1875, £950; in 1876, a surplus of £2312; in 1877, a surplus of £3115; and in 1878, a surplus of £1948. The total amount of share capital authorized under existing Acts is £225,000, and of that amount £200,000 has been paid up. The remaining £25,000 has been issued since the end of last year, but only a portion of it called up. In regard to loan capital, the amount raised has been £51,200, and we have still an unexhausted limit of £6300. In the year 1878 we supplied 287,578,000 cubic feet of gas to private consumers, and 16,747,000 to the public lamps. The total quantity sold was 304,325,000 cubic feet, and the difference between the quantity made and the quantity sold was 25,435,000 cubic feet, which amounted to about 7·70 per cent., which will compare favourably with the working of companies all over the kingdom. We used 32,792 tons of coal, costing us £26,246, or 16s. 0·09d. per ton, equivalent to 20·59d. per 1000 cubic feet manufactured. The residual products for the year realized £12,094, thus reducing the net cost of the coal to £14,152. The product of the residuals represented 9·53d. per 1000 feet of gas sold, leaving the net cost of the coal for every 1000 feet sold at 11·16d. The cost of the purifying materials was £787; trade charges, £5162; rents, rates, and taxes, £2009; salaries and commissions, £4561; wages, £7355; interest on loans, £2474; bad debts, £212; making a total cost of £37,516, or 29·58d. per 1000. The average price realized was 44·03d. per 1000 cubic feet, leaving a profit of about 14½d. per 1000. The total gas and meter rental for the year was £55,831 19s. 9d. The amount of fresh capital asked for in this Bill is estimated by the rate of increase of the Company's business, and for that purpose we cannot do better than fall back on what we have done in past years. In 1859 we sold 71 million feet; in 1866, we sold 150 million; and in 1878, we sold 304 million; so that we have doubled twice since 1859. Going on those data, which show an average increase of 6 per cent., we ought to provide sufficient capital to last us for about twelve years from now, and if we have the capital asked for by the Bill, I expect we shall be able, in one way and another, to go on for about twelve years without asking for any more capital; and the borrowing powers that would follow that capital would take us on for about two years more. That is on the understanding that we do not greatly exceed the rate of 6 per cent.; but it is quite possible that we may increase more than that, for there is a great deal of land which, if built upon, we shall be compelled to supply. We have no longer any conceivable interest in the issue of new capital, but we have a strong interest in the restriction of that issue. Directly the auction clauses apply to us, it is to our interest that capital should issue as slowly as possible, and I can foresee that the Directors will exercise very great care indeed as to future capital expenditure. They will make sure that new works are actually demanded, and that they will be remunerative, so far as their Act of Parliament will permit them to do it.

By Sir E. BECKETT: Under the Act of 1866 one-half of our capital had to be submitted to public auction, and the other half remained for division amongst the Proprietors.

Examination resumed: In 1878 the proportion of capital for each million cubic feet of gas sold was £826; it was at one time as high as £981, but year by year the proportion between capital and business has improved. With respect to land, the present site is not entirely occupied, but some buildings are designed which will entirely occupy the spare land, and when that is done, we shall have none left beyond the ordinary roadways. It is very desirable, if we are to make our gas in the best way, that we should have some additional premises; and, looking to the increase of our business, it is necessary that the land asked for should pass into our possession. The total amount of land scheduled in the Bill is considerable, but for the purposes of the extension of our works, the property required would not exceed about 5½ acres. In addition to having that land for purposes of extension, it is also necessary that we should have it for the purpose of safety. That is our strongest reason for asking for the land. There are rival claimants to the land, neither of whom can give such a title as the Company care to have, and that is why we ask powers to take the land compulsorily. Such powers, I believe, are not objected to by the claimants to the land, but it is very desirable we should have it, because we have to fight a continual battle with the sea, which beats with great force upon the beach, and of late years it has encroached very much on each side of the Company's premises. I remember the time when the high-water mark was just 100 feet to the southward of the Company's premises. That was about the year 1865. Since that time it has come right up to the front, and passed them on each side. We have already been obliged to erect some groynes, and we consider it essential in order to preserve our property, to erect some defensive works on each side. We have already spent more for the purposes of protection than the entire value of the land, and, unless we can acquire the adjoining ground, we shall have to spend a further very large sum. In consequence of the rival claims to it, the property has been left entirely unprotected. What we propose to do will considerably benefit Shoreham Harbour. In the first place, we shall certainly oppose a barrier to the inroad of the sea, of the length of the land proposed to be taken—some 1600 or 1700 feet—and for that length they would no longer have any anxiety, or be at any expense. We have already very greatly benefited the Shoreham Harbour Trustees by erecting and keeping up our own wharves, and by the large amount we yearly pay to them for dues. We propose now to erect more wharf accommodation, without extending a single inch into the canal, beyond the line of the present wharf. The powers of easement asked for over the towing-path are simply to give us the right to lay water-mains. We have already an easement for the purpose of laying our gas-pipes, and, as the well water on our premises became unfit for use, it was necessary for us to seek a supply elsewhere. We did get a supply from the Shoreham Water Company, but we were compelled to make an arrangement with the owners, through the Water Company, for permission to place a small water-pipe down the towing path, in consequence of our want of power to do so. The agreement was enterred into for a term of seven years—about four years of which have expired—and at the end of that term the owners might compel us to remove the pipe. We wish to guard against that, and for that purpose only we seek the easement over the land. It would inflict no harm upon any person, and there cannot be the slightest inconvenience to any one. We maintain the towing-path as a road, although other persons have rights over it. There is nothing in this Bill altering or repealing existing legislation. The prescribed illuminating power of the gas supplied by us is 14 candles, which is the quality generally prescribed. It is the quality set forth in 292 of the 360 Gas Acts which have been passed since 1865. In supplying 14-candle gas, we are practically obliged to give gas of a still higher illuminating power. The returns of the Analyst show that our gas averages about 14¼ candles. From 1866 to 1873 we supplied the Corporation lamps with 5 cubic feet per hour. In 1873 the quantity was reduced to 4 feet, but the Corporation did not reduce the distance between the lamps, and Brighton has not been so well lighted since. For a very long time we thought that the price of gas in Brighton was the lowest in the kingdom, and I believe it is now, if all things are taken into consideration. We have none of the advantages which manufacturing places have; we get a low price for our residuals, we have a scattered district, there are no manufactories, and, in fact, very few large consumers. In 1873, owing to the high price of coals, we were actually selling gas at less than it cost us, and we had to come to Parliament for temporary relief. We were not like a great many companies, having a maximum price above that which they charged; but we were charging our maximum, and it gave a singular and forcible illustration of the insufficiency of that price. The same thing might occur again, and we should have to do as we did before—fall back, in the first instance, on our undivided profits, and then apply to Parliament, and ask them to relieve us again, temporarily or otherwise. There are no gas-works in the kingdom more free from nuisance than ours; we have every facility for keeping them so, and we ought not to create any unusual nuisance there. The nearest house is about 700 feet from the Company's premises, and nothing is proposed to be done, under this Bill, which would create a nuisance. I suppose we pay the Harbour Trustees from £1700 to £2000 a year, directly or indirectly. We pay them certainly £1400 a year directly in dues. They charge 10d. and a fraction upon every ton of coal that comes into our works, and, taking that into consideration, with the fact that we find our own wharves, and maintain them, I think I may say that we are really their very best customers.

Cross-examined by Sir E. BECKETT: All the clauses in relation to the electric light have been removed from the Bill. We do not wish to sell gas-fittings, in the ordinary sense of the word, but gas-stoves, and perhaps gas-engines. We should not dream of setting up a shop for the sale of hot-water apparatus, nor do we want to have the power. The gas-engine trade is comparatively new; it has only been in existence during the last ten years. We did originally contemplate taking power for electric lighting, but the idea with regard to it was never matured; we made no provision whatever for it on account of capital.

Sir E. BECKETT: We were rather taunted yesterday with not having applied for the extra candle we could have had under the Act of 1866; but do you think it was at all an unfair provision that we should have to pay 3d. extra for that candle?

Witness: Yes, I think it was; but it was one of your own clauses. At that time, and for some years later, the Corporation were advised that the value of one candle was 3d., and that is the reason why it found its way

into the Bill. Before the Committee in 1873, I gave it as my opinion that the value of a candle was 1d., and I based that upon the result of several years working. I believe it was the intention in both Houses of Parliament, in that year, that we should be relieved to the extent of 1s., and the Committee thought that 6d. in price and two candles in illuminating power, making another 6d., would give us relief equal to 1s.; but there was no evidence before the Committee, and nothing beyond the statement of counsel, to show that it was worth more than the 1d. at which I placed it. Since 1866 our shares, which have been sold by auction, have gone more amongst the public than amongst our Shareholders. Our £20 shares with 10 per cent. dividend have been sold for £30; while those limited to 7 per cent. have been sold for £23. Our works are pretty nearly up to their full power, so far as they are constructed. The retort power was erected for the supply of 1½ million in 24 hours, and last winter we made more than 1¾ million. An additional £25,000 would enable us to produce 3 millions. The sum of £25,000 simply included the retort-houses and the retorts, and the necessary amount of coal storeage for that purpose. I am aware that the general price in London is 3s. 6d. for 16-candle gas, but the margin we give is something like half a candle more than they give in London. We have 24 benches of retorts, and 8 retorts in each bench, about 22 of which were at work last winter, and I think we averaged about 5000 feet per mouthpiece. We make 10,056 feet per ton of coal, and sell 9284. We use the best Newcastle coal we can get. The proportion of cannel depends upon the quality, some cannel being twice as good as others; of the best we use 2½ per cent.

Sir E. Beckett: In 1873 there was a curious clause, which I never saw in any other Act, except your Act of 1866, clause 9:—"The Company shall, from time to time, at the request of the Corporation, supply all or any of the public lamps with so much gas, not being less than 15,000 feet per lamp, as the Corporation may require." The limitation is not a common one, is it?

Witness: I am under the impression that in 1866 several Acts had limitation clauses of that kind in them, but I cannot give you the names of them now.

We are now 13 years older and wiser, you see. That clause has the effect of preventing the Corporation from putting down new lamps and lighting them for a few hours at a time, has it not?—I think it was intended to act in that way.

But why should not the Corporation be at liberty to have what lamps they like, the same as anybody else?—Because they do not burn gas under the same conditions as anybody else.

Cross-examination continued: A portion of the Hove district is lighted under an arrangement which enables the gas to be burnt for a few hours now and then, or not at all, and the restriction as to quantity is entirely removed. It is the same with the Shoreham Local Board; but that is because they have a meter attached to every lamp, and the quantity of gas is ascertained, and they are at liberty to burn as little or as much as they think fit. The Brighton Corporation are not prevented from burning as much more as they like, but they are prohibited from burning less, on account of the gas being supplied by average meter indication. At the time that clause was passed the gas was supplied by contract.

Mr. Shiress Will said he did not find that question raised in the petition.

Sir E. Beckett said it was a question of rates. Supposing the Corporation put up a lamp in which they wanted to burn 10,000 feet in a year, on the average, they could not do it without paying 50 per cent. more.

The Chairman: I think that just comes within your petition.

Sir E. Beckett: Of course it does. But I have got all I wanted.

Cross-examined by Mr. O'Hara: I am not aware that the Shoreham Harbour Trustees have a power of going over a portion of the land proposed to be taken for harbour purposes; but if we take that land, we take away all reason for their going across it. We propose not only to protect our own works from the incursions of the sea, but also the Shoreham Harbour. I strongly object to the groyning works we propose to execute being subject to the approbation of the Shoreham Harbour Trustees, because it would be in opposition to the general law upon the subject, which sets out that the sea is a common enemy, and there ought to be no limitation to anybody's actions in defending themselves against it. Another reason was that it was proposed to hand over a valuable property to an authority which was not fit for the purpose. The Harbour Board, as a present constituted, is a feeble and irresponsible body, and I should expect that if they were invested with the powers sought for, the Company's premises would be unfit for the purposes of the Act, and they would have to retire from the place altogether. We do not seek power to project into the canal any further than the line of the existing wharf, and therefore we do not in any way seek to interfere with the traffic. We seek to obtain complete control over the eastern arm of the harbour, for the purpose of erecting wharves and quays in such positions as we think fit. We have never applied for the consent of the Harbour Trustees, because we have not required it up to the present time. Supposing the Committee gave us power over a portion of the eastern arm of the Shoreham Harbour, we would limit ourselves not to place any of our works or wharves beyond the existing pier, because I think it is right that the navigation should be kept open. We should not object to make any plans of groynes which we desire subject to the Board of Trade as an arbiter, and as a superior power which we might both accept. We would very willingly allow the Trustees to have the entire responsibility and honour of groyning there, if they will guarantee us against any disadvantage from the sea.

Mr. O'Hara: I am told that the parties who instruct me are satisfied with a great deal of what you have said, but they make the proposal that you should serve them with notice of the plans; and if they approve, or give you no notice within a certain time, you would deem that to be an approval, and go on with the work; that if they disapprove, you shall not go on with your work, but you may appeal against their decision to the Board of Trade, and leave the decision to that Board.

The Chairman said he thought the parties would very likely be able to arrange the matter.

Cross-examined by Mr. Granville Somerset: Under the Act of 1866 the Corporation of Brighton have power to make a special audit of the Company's accounts, and I have no objection to the authorities at Hove having the same power, provided the Company be in no way inconvenienced or put to expense upon the subject. I may, however, point out that it is generally considered to be wholly unnecessary. It would be very inconvenient for the audit to be made at certain times in the year; it would have to be done as the Brighton people do it—take a proper time for it. The accounts are now published in the newspapers, so that Hove is already in possession of them. The General Act of 1871 is not incorporated in any of our Acts, chiefly because it would come into conflict with the Act of 1866, and also because there are scarcely any of the provisions of the Act of 1871—in fact, I do not know that there are any—that are not provided for in the Act of 1866. We have always looked upon the Act of 1866 as being chiefly a Brighton Corporation Act, and we have been very anxious not to disturb any legislation in that respect. We have some contracts based upon it; and, taking into consideration the provisions of the Act of 1866, we stood in less need of that incorporation than any other company I know of. If the Brighton Corporation do not object to the incorporation, I shall not refuse. It would have the effect of repealing the present form of accounts provided in the schedule to the Act of 1866, and of improving those accounts for public information. We are quite prepared to deposit a model burner at Hove, the same as at Brighton; but we cannot agree to the public lamps being placed 80 yards apart, instead of 60, as, taking into consideration our relations with the much larger district of Brighton, it would have a disturbing influence. The west end of Hove is not a fashionable part, although some of the western portions are fashionable. We have four gasholders on the land adjoining the church, and an uncompleted one which will be finished in a few months. The gasholder was not commenced in spite of the expostulations of the Hove Commissioners, but because it was our own ground, and we had a right to do so.

Cross-examined by Mr. Willoughby: The reason for the extra charge at Shoreham is that it is so far from the source of supply, and that they take so small a quantity; the expense of supply is also greater in one case than the other. We charge Portslade 4s. 6d.; but except for the accident of being near large works, they would have to pay very nearly double that price. If they had to provide their own works at Shoreham, they would have to pay a much higher price than they do at present. The whole of the Brighton Railway stations are supplied at a uniform rate of 3s. 6d. The pressure at New Shoreham and neighbouring districts is necessarily less than at Brighton and at Hove, on account of the distance and the small mains; but it is amply sufficient for their purposes. Complaints have been made of the quality of the gas.

By the Referee: We had a correspondence with the Local Board, in which they complained of the quality of the gas; but it was pointed out to them that they had exactly the same gas as that supplied to Brighton and Hove, which was always tested; but they still said it was bad.

Cross-examination resumed: In reply to the complaint of the New Shoreham Local Board, I replied that upon inquiry I was informed that the public lamps were in a most unsatisfactory state; but those lamps being under the control of the Local Board, the Company had no concern with them, except to give an ample supply, which they did. We object to the New Shoreham Local Board having any appeal to the Board of Trade on the question of price, because we do not propose to alter, repeal, or affect past legislation in any way. The outlying districts have no such power at present, and I do not think it desirable, in the interests of the Company, that they should have the means of incurring litigation. I believe that would be the only practical result of their having such power.

Mr. Willoughby: In our petition it is submitted that "if any further powers be conferred upon the Company, such as those sought by the Bill, it should be upon the express condition that separate accounts should be kept by the Company of the expenditure for gas purposes proper, or for other purposes referred to in the present Bill?" Do you object to that?

Witness: So far as it is an impossibility, of course I must object to it. You are asking for that which cannot exist. It would be simply impossible for us to keep an account of the gas supplied for gas-stoves and engines, and gas supplied for lighting purposes. Supposing we sell a gas-stove, or anything of that kind, we should have no objection to keeping those items apart from the question of the gas. We have been asked to reduce the price of gas, but we have refused because we do not consider the present price is sufficient to cover the fluctuations in the price of coal. We may have coal dearer, but I do not think there is any possibility of it being cheaper than now.

Re-examined by Mr. Shiress Will: The existing maximums were fixed in 1873, after a very lengthened inquiry in both Houses of Parliament. The result of those prices has been that, at the present time, the gas sold by the Company in those outlying districts at the higher prices is less remunerative to the Company than the gas sold in Brighton and Hove. The price of coal has gone down since 1873; but other expenses have increased—wages notably. If any nuisance should be created by the Company, a sufficient remedy could easily be obtained. The audit made at the instance of the Brighton Corporation is one of the most exhaustive of which I have any knowledge, and the results are published in the local newspapers. It cannot be too clearly understood that the new capital is intended absolutely and entirely for the purposes of new business, and if that business does not come, the capital will not be expended.

By Mr. Willoughby: The item for "Wages" in 1873 was £7539; in 1875, £7235; and in 1878, £7355; but there is some difference between the way the accounts are now kept and the way they were kept in 1873, but that alteration has been rather a gradual one. For instance, all the wages expended in getting coals into the works are now charged against the item of "Coals," and that item appears so much the larger, while the item of "Wages" is smaller. The coke expenditure, all connected with the residual products, and some matters connected with the maintenance of works, are all treated in the same way. As a matter of fact, the rate of wages per 1000 cubic feet has decreased, on account of the increasing magnitude of the Company's operations, but not to a great extent.

Mr. Somerset said Mr. Paddon had stated that he had not the slightest objection, on behalf of the Company, to incorporate in the present Bill the Act of 1871, supposing it was not objected to by the Brighton Corporation, and the adviser of that Corporation said he wished to see it done. He therefore wished to know if Mr. Richards conceded that point as well as the witness.

Sir E. Beckett said he must look through the Act, but unless there was something he was not aware of he should not object.

Mr. Richards said he neither assented nor otherwise to the proposal, as the Corporation of Brighton declined to give any answer at present.

Mr. Somerset said he should do his best to carry his point.

Monday, March 24.

Mr. *G. W. Stevenson*, examined by Mr. Michael.

I am intimately acquainted with the district supplied by the Brighton and Hove Gas Company. Additional works are now required, to allow the Company to carry on their business safely. They have room upon their present site for the extension of their manufacturing operations, but they require land for the storeage of coke and the reception of materials. The Company are now carrying on their business in a somewhat hazardous fashion, because the sea is encroaching upon them on both sides of their works, and it is absolutely necessary for them to acquire the foreshore on those sides. It can hardly be called land; in fact, it is shingle, and can only be made permanent by expensive works in the way of groynes, which offer an obstruction to the retiring waves. The proposed addition to the capital of £250,000 will be expended in twelve years at the present rate of increase. Within the area of the Company's supply, building is going on very extensively—houses being built reaching up to a rental of £1000 a year—and that will call for an additional supply of gas. Looking at the history of the Company, I do not see why the price of gas should be diminished. The Company submitted in 1866 to the price of 3s. 6d., and that was then and is now the lowest maximum price inserted in any Act in the kingdom. The lowest standard in London is 3s. 6d., but the usual standard is 3s. 9d. There is a great difference between the maximum and the standard price; the former has usually been put above the latter.

The cost to supply gas into the consumers meters is 2s. 5½d. The sum required for dividends is 1s. 1d., and the Company will have immediately to expend more money, upon which a further dividend will accrue, equivalent to about 2½d. per 1000 cubic feet. The Company will not be able to pay their maximum dividend until that capital becomes remunerative. Extensions of gas-works cannot be made from year to year in the ratio of the increase of demand. A large extension has to be made at once, which will last for several years, and it is some time before the consumption and the revenue overtake the expenditure. It is not proposed to change the illuminating power of 14 candles, which is the uniform standard, except in very large cities and in places adjoining the cannel-fields. During the last 15 or 16 years, in the case of 80 to 90 per cent. of the Acts which have been granted, 14 candles has been the illuminating power, and the same has been the case in every Provisional Order granted by the Board of Trade. I have always been of opinion that it was desirable for gas companies to lend stoves and engines, apparatus and fittings, for the purpose of utilizing gas for heating and cooking purposes. It is also likely to be valuable as a motive power. I think the Company will derive as much profit from that as from the sale of gas. The Crystal Palace District Gas Company have more than 600 cooking or heating stoves on hire, and they derive an income from them equal to about 7½ per cent. on the capital invested. I think there is no reason why the Company should not keep a separate account, and know exactly what they are doing, as to revenue derivable from a certain amount of their capital. I think it would be a proper thing to allocate a portion of the capital to these purposes.

By the REFEREE: The Crystal Palace District Gas Company have some doubts as to whether it is legal to do what they have been doing, and they are coming for power this session.

Examination resumed: Under the Gas-Works Clauses Acts of 1847 and 1871 there is power to let out fittings and apparatus; but the question is, what is apparatus? During the last four years there have been 61 instances in which companies have been authorized to manufacture, sell, or let on hire gas-fittings and other apparatus. The three great things the Company strive for are to supply stoves for cooking and heating purposes and gas-engines.

Cross-examined by Mr. GRANVILLE SOMERSET: I do not think the Company desire to become shopkeepers, and I think they ought to be prevented from becoming such. The object of the Company is to do business at a profit, and to pay dividends with the least possible trouble to themselves and the public. No doubt, if they lost, the consumers would lose also. When shares are offered by auction, I should say the outside public buy them because they consider they are good things. The accounts are published, and every one can ascertain what the profits of the Company are. With regard to testing, I do not think any notice should be required, so long as the test is made in the presence of the Officers of the Company. It is impossible for the gas to be altered very quickly; it is made two miles from where it is stored, and the testing-place is 4½ miles from the works.

The REFEREE (to Mr. Michael): The 14th section of the general Act is the only one that applies to fittings, is it not?

Mr. MICHAEL: And the Act of 1871, under the 28th section.

Cross-examined by Mr. WILLOUGHBY: I cannot conceive any objection to the usual clause as to pressure—6-10ths day and 8-10ths night. With regard to street lighting, there ought to be governors to the street-lamps, but I do not know whether there are or not; if not, there will be no objection to a clause requiring their use. I think it would be a cumbrous operation for Brighton to have Gas Referees appointed; the Corporation already appoint a Gas Examiner. The Company intend to manufacture all their gas at Portslade, as at present, and store it at Hove. If any is stored at Portslade, it will be only for the supply in the immediate neighbourhood. In addition to paying 10 per cent. in 1878, the Company carried forward £4309 to the reserve-fund, making over £11,000. The sooner that reserve-fund gets full and invested, the sooner the price of gas will be reduced to the consumers; or the Company may be liberal enough to reduce the price before the reserve-fund gets filled. I quite agree with Mr. Paddon in his reasons for the differential rates charged. Consumers sometimes take a different view, but they are, generally speaking, sensible people, and when figures are laid before them which prove that they have been under a wrong impression, they are amenable to reason.

Cross-examined by Sir E. BECKETT: I do not know what the normal expenditure is for pipes in Brighton. I know that the sale of gas has made certain progress, and that it has cost the Company a little over £800 per million feet, but I cannot dissect that amount.

By the COMMITTEE: The Company are prohibited from manufacturing gas at Hove, but not from storing it. There is no nuisance from the storeage of gas. Gasholders are not sightly things, but they are not dangerous. I do not know that there are any obligations on the Company with regard to the pressure.

Mr. MICHAEL said the Company were under contract to supply at not less than 6-10ths, but there was no obligation in the Act. Lord Redesdale, however, insisted upon a certain minimum pressure being inserted in every Act, and that could be done in the present instance.

Mr. *Alfred Penny*, examined by Mr. MICHAEL.

I know the Brighton and Hove Gas-Works very well, and also the whole of the district. I think it is very desirable that the two extra pieces of land applied for should be obtained. I happened to be at Brighton two years ago when a great storm was raging, and I then saw quite enough to satisfy me that the works required more than ordinary precautions to keep them together in case such a storm should occur again, and I also observed that they wanted protection on either side. The gas manufacture at Hove was no doubt carried on at an improper place, inasmuch as houses had accumulated round them. The Company, therefore, fell in with the suggestions of the Local Authorities, and carried their manufacturing works to where they are now, which is about as unexceptionable a place for the manufacture of gas as can well be imagined. The work is carried on in the most scientific manner, with plenty of space, and that has a tendency to prevent a nuisance. As to the storeage, I have heard some people take exception, from an æsthetic point of view, to the appearance of the gasholders; but, in my judgment, they are rather ornamental than otherwise; they are extremely well constructed, upon scientific lines, and are really not at all objectionable. Having parliamentary obligations placed upon them to supply gas, I do not see how they are to fulfil these obligations unless they have more land on which to place additional buildings and apparatus, and more money to pay for them. With respect to the price of gas, I think, having regard to the ordinary course which Parliament has pursued in these cases, that there should be some margin over and above the actual sum required to make the gas and to pay dividends, and I think that margin does not exist in this case. At present the maximum price is so low, that I cannot imagine anything can be said as to a reduction of it. I think the power to supply apparatus is one which gas companies have hitherto neglected to exercise. It is quite clear there are many purposes for which gas might be used which have not been much tried up to the present time—more particularly for lighting and heating—and I believe that the principal reason why that power has not come into more general use has been that the apparatus has not been of a character to recommend itself to the public. Gas-stoves and cooking-stoves have been badly manufactured, and the public have not cared to spend as much money as was necessary for their purchase. I think, as soon as the companies take it upon themselves to let them on hire, many people will use those stoves, and find them much to their own advantage. I also think such business can be carried on to the profit of this Company. With regard to the extra cost for supplying the outlying districts, it constantly happens that corporate bodies complain that extensions are made into outside districts, to their disadvantage, and Parliament has met the case generally by giving them the power to charge a higher rate outside; and that has been exercised in some 70 or 80 cases within a recent period. In some it is as high as 3s., and goes down to 6d.; and I think it is a proper thing to do, and perfectly fair to all parties concerned. I know that the testing-place is 4½ miles from the place of manufacture, and I have heard it stated in these committee-rooms that gas will lose from one to two candles by its transmission for so long a distance, but I have never held that opinion myself; at all events, it does not gain anything. If the gas, as tested at Brighton, gives the illuminating power named in the special Act, I should say there is nothing to complain of on behalf of the consumers. From my knowledge of gas-making, I consider the works are admirably conducted. They have ample purifying power; and, in fact, all the apparatus is constructed in the best and most scientific form, so as to give the best results.

Cross-examined by Sir E. BECKETT: I know that the illuminating power is tested by a different burner from what it was in 1873, which is a small benefit to the Company. I am not prepared to say which is the best gas-stove; but if the gas companies have the power to make and let those stoves, they will take care to have the best that can be obtained. The shopkeepers at present do not profess to do what the Company are willing to do—viz., let the stoves; they want to sell them, and that is why there are so few in use.

Cross-examined by Mr. WILLOUGHBY: I think it will be very difficult to erect a gasholder at Portslade, on account of the nature of the soil. The price charged to the outlying districts is fair and proper, comparing it with the price paid by the Brighton consumers. I know that the accounts for 1878 show a considerable improvement upon those for 1873, but that has nothing to do with the small increase they get from the 12 million cubic feet which they sell at the extra charge at this time. The present is an exceptional period altogether; we have coals very low, iron very low, and wages have been reduced. I hope, for the sake of the country in general, that this state of things may not last; and, if it does not last, all those fine things which appear in the 1878 balance-sheet may change entirely. I do not mean to say that the charge, having been once raised, should never go down again, but I do say that the present margin of profit on the maximum price is a very small one, and if any exceptional circumstances should arise, this Company will be driven to come to Parliament again to help them, as they came before.

Mr. WILLOUGHBY: Have you any objection to our being able to go to the Board of Trade, like Brighton and Hove, so far as regards price?

Witness: I do not consider that the Board of Trade can do anything to override the decision of Parliament, excepting when they have powers given them specially. Those powers have now lapsed; the price has been reduced, and there is nothing more for them to go to the Board of Trade for.

Re-examined by Mr. MICHAEL: I do not understand that power was ever given to the outlying authorities to go to the Board of Trade. If a loss occurred upon the supply to the outlying districts, it would fall upon the consumers in the more thickly populated districts, and would prevent any reduction below the 3s. 6d.

Mr. *S. Clarke*, examined by Mr. MICHAEL.

I am Solicitor to the promoters of this Bill. It is necessary, in order to acquire this land, that we should have powers to take it compulsorily. In 1866 the Company had entered into contracts with landowners at Hove for the possession of land on which to extend the works, but in deference to the suggestions of the Commissioners of Hove, the works were removed. There has been a very large increase in the rateable value as well as in the number of houses in Hove, and also generally within the Company's district, rendering it necessary to have further capital.

Cross-examined by Mr. GRANVILLE SOMERSET: I have been Solicitor to the Company for between 30 and 40 years. A vast number of houses have been built in the neighbourhood of the gasholders at Hove since 1874. I think some objections were made when we commenced our new gasholder in 1876; but they were really of no moment. We had a perfect right to place our gasholders there, and we had no other place beneficial to the consumers where we could place them. We applied for a Provisional Order in 1875, which we obtained. Whether or not we asked for more capital than we got, I will not undertake to say; but we got what was necessary for us—I think it was £50,000.

Cross-examined by Mr. WILLOUGHBY: When the Company obtained their Act in 1873 there was no opposition from the outside districts—only from the Corporation of Brighton. I am not aware that the Board of Trade are opposed to the differential prices being charged by a gas company.

Mr. PRICE: Referring to the Act of 1873, by clause 6, under certain conditions, the illuminating power may be increased from 14 to 15 candles, and at the end of the clause it states, "In such case the Company may charge a price not exceeding 4s. 3d. per 1000 cubic feet in lieu of 4s. per 1000 feet as in this Act is mentioned." In the third clause the sum of 4s. is mentioned as the maximum charge which can be made by the Company to Brighton and Hove; but in clause 6 there is no mention of other charges—viz., the charge made to Portslade of 4s. 6d., and 5s. 6d. to other places. Taking those two clauses together, are we to understand that, in the event of the illuminating power being raised from 14 to 15 candles, the Company could not make those maximum charges to places other than Brighton, as specified in the third clause?

Witness: I think it would only apply to Brighton and Hove.

Therefore, in the event of the illuminating power being increased, those other places would be benefited?—Yes; they would get the benefit of the increased illumination.

Mr. MICHAEL said that was the case for the promoters.

Sir E. BECKETT (on behalf of the Corporation of Brighton) said he would call a witness before addressing the Committee.

Mr. *R. P. Spice*, examined by Sir E. BECKETT.

I have visited the Brighton works, and am acquainted with the position of the Company. My estimate is that they can go on for seven years without any further expenditure of capital than that which they have already power to raise, except so far as the acquisition of some portion of the sea beach is concerned, and also the groynes. They have already power to raise an additional £25,000, which would include what they would require for distributing mains, the trunk mains being already laid, and of sufficient capacity. The sum of £30,000 would carry them on for a long time, giving them all they require for groynes and other works. Sixteen-candle gas is the stereotyped illuminating power for London, and it is quite as easy to make gas of that quality now as it was years ago to make 14-candle gas. Modern improvements have enabled gas-makers to give 16 candles by the new burner, without incurring

any more expense in the manufacture. I think the Brighton Company ought to give 16 candles. I do not know of any gas company having power to deal in gas-fittings, stoves, and engines. I know of some who are applying for it, but I know of none who have it, except under the general Act. There are no peculiar difficulties in buying such things in the shops in Brighton, and I object to the system altogether. The most remarkable modern instance on record exhibiting the unadvisability of gas companies becoming gas-fitters—for that is what it amounts to—is that of the Liverpool Gas Company. They had a gas-fitter performing some operations on their behalf, on or under the landing-stage, and by some accident he set fire to it, which cost the Company between £80,000 and £90,000, besides a considerable amount of litigation. If anything like that happened to a smaller company, it would either be a serious loss to them, or a burden upon the consumers of gas, through maintaining a price, otherwise unnecessary, to recoup the company that loss. I conceive that a new company—composed of the same shareholders, though in a separate form—might obtain the principal object, which is, that gas-fitting may be better done, and the use of gas brought more into favour. Pipes of a sufficient diameter, well laid, free from the nuisance of leaking—which means smell and all sorts of disagreeables—is the object gas companies have in view in seeking to make gas-fitting a part of their business; but it cannot be done in any case without interfering with the legitimate business of the ordinary trader. Supposing they made no profit, the effect would be to prevent their reducing the price of gas. It would also give them a practical monopoly of the trade, because no one could compete with them successfully. With regard to the curious provision that the Corporation may not consume less than 15,000 feet in any one lamp, it is very undesirable that there should be any fetters of that kind. The Corporation ought not to be obliged to keep their burners alight for a fixed period, but should be left to adapt their lighting to the wants of the district, because they might choose to put out a certain number of lights at midnight. I have known companies apply to Parliament, saying that if they could not obtain more capital they could not go on for two years; but even then they were not allowed anything like such an increase as is now proposed. Now that the electric light project is abandoned, there is still less excuse for it; and if the power of dealing in gas-stoves, &c., is struck out, a greater reduction can be made. I do not say that they have money enough to erect buildings on the unoccupied portion of the land, but I say it is altogether unnecessary now, and will not be necessary for seven years to come.

Cross-examined by Mr. MICHAEL: On the assumption that the capital is required—that the Company have really fully occupied all their premises and pipes and mains—it is not unusual for them to ask to double their capital. As a rule, it takes a company about ten years to double their supply; but I think Brighton would be slower than ordinary places. So far as I have been able to judge, the rate of increase is 6 per cent., although it is increasing considerably in the outskirts. I apprehend that the trunk mains are sufficient, but I do not know at this moment what size they are. My source of information is the statement of Mr. Paddon, read before the Institution of Civil Engineers. Nothing was said there about the necessity for extending and enlarging the mains. The data upon which I base my calculations is the fact that within the retort-house 40 per cent. more gas may be produced than was made last year. I have not gone at all into the question of distribution. If anything more is required for mains, of course it must be added. There is a reserve power in the retort-house, but I have not gone into the percentage; only the number. The reserve power is 32 mouthpieces, which is quite sufficient. I do not know of any circumstances in this case to call upon the Company to use the whole of that reserve power. I consider that the arrangement of the retorts should be brought up to the requirements and knowledge of the present day. Each retort should yield 7000 feet of gas per mouthpiece, instead of 5000. The alterations required to bring about this result would cost next to nothing, because as the retorts are worn out they may easily be replaced by others set upon the new system. That increased make of 7000 feet could also be obtained at a less cost than the 5000 feet, because there would be a saving of labour, and also of wear and tear, a greater quantity of gas per ton of coals, and a higher illuminating quality. Mr. Paddon gives something over 10,000 feet from a ton of coals, but I propose to get 10,400 or 10,500. The rule about mains is that they shall cost about one-third of the whole expense; and the remaining two-thirds is the cost for works and plant, land, and everything else. I consider that the clause with reference to the letting out of gas-fittings opens the door to a large business, which would tend to the injury of the ordinary trade of the ratepayers, and would be attended with risk to the Company. It should be done with a separate system of accounts, or, better still, by a separate company. By the clause as it stands, I apprehend that all kinds of gas-fitting could be done I have no objection to the lending of apparatus, provided that a separate account were kept, because it would tend to the benefit of the Company and also of the consumers, especially as gas would be consumed in the daytime, which is an object worth carrying out by every gas company. With regard to the charge for gas, I think, in the present case, the arrangement is fair and proper, and that Brighton ought to be supplied at a less price than the outside districts.

By the CHAIRMAN: The Liverpool disaster was caused through the Company putting up lamps on the landing-stage, and so doing the work of gas-fitters. The result has been the severance of that business from the Liverpool Gas Company's business, and the formation of a separate company. No individual trader could stand against a company having command of capital to any extent they might require, and who might do the work without a profit, for the sake of encouraging and increasing the business of gas supply. They could sell the apparatus at what price they liked. The advantage to the public would be attended with great risk. It is a monopoly that has not yet been set up, and I doubt whether Parliament will grant it. I do not think that gas companies would sell stoves that would consume an unnecessary amount of gas. They would want every one to be satisfied that gas was a good heating medium, a good cooking agent, and so on; the object being to induce a supply of gas in the daytime, when the mains were comparatively unused.

By the COMMITTEE: The system of separate accounts would be a safeguard to the consumers, so that the gas should not be made to pay, by an unnecessary profit per 1000 feet, for any omission to make a profit by the dealing in gas-stoves.

Sir E. BECKETT said he had several more witnesses in attendance, but after the admissions made by the other side, and the evidence given by Mr. Spice, he did not think it necessary to call them, but would proceed at once to make some remarks on the Bill. The first point to which he would direct attention was the outrageous increase of capital which the Company asked for. Mr. Paddon gave them some ingenious figures to show that such an increase was necessary, but as soon as the matter came to be dissected, Mr. Paddon was obliged to admit that, so far as any specific works which he could indicate were concerned, only a very small sum of money was wanted. It appeared that £25,000 was sufficient to do all that was required at the works to double the present supply, and to meet the requirements of the next ten or twelve years. Possibly a further small sum might be required for additional mains, and he would admit there might be some £6000 or £7000 wanted for groynes. With these exceptions, they could go on for at least another seven years without coming to Parliament. Under these circumstances, what possible pretence could there be for asking for such a huge amount of fresh capital as £250,000? The present nominal capital of the Company was £225,000, of which £25,000 had not yet been called up, and they also had unexhausted borrowing powers to the extent of £6300. Practically, therefore, they had still £31,000 to work upon, and he contended that, with a slight addition to that sum, they ought to be contented. The object of applying for such a large increase of capital was obvious. The more capital they obtained the longer they could keep out of Parliament, and they knew that every time they came to Parliament they had to give up something for the benefit of their customers and the public. The Corporation of Brighton, whom he represented, wished to prevent this Company from being in a position to keep out of Parliament for probably the next 20 years. If they had asked for only £100,000, he should have had to make the same objections, but even that sum would be much greater than they could show any real need for. The outside limit of what they ought to get was £80,000, which would carry with it borrowing powers to the extent of another £20,000. With regard to the question of price, it was assumed by both Houses of Parliament in 1873 that they thought they were giving an extra price of 1s.—6d. by virtue of the candles, added to the price, and 6d. by virtue of the altered burner. Supposing Parliament had known in that year what was going to happen subsequently, would they have given the Company that increase? They clearly would not, and that was shown by the accounts which had been put in, from which it appeared that in that very year, in which they were going to be ruined, their sale of residuals rose almost as much as the coals had done. The Corporation said that would happen, but Mr. Paddon was convinced it would not, and the Committee took his view, and gave that increase, and the result was that instead of being ruined, they went on paying a dividend of 5 or 6 per cent. Why should a man who invested his money in gas-works consider himself entitled to 10 per cent., when railway shareholders thought themselves comfortable and rich if they obtained 5 or 6 per cent.? Having secured an increase in 1873 of 6d. in the burner, they now asked to have it continued, in order that they might go on receiving 10 per cent., which they said was due. But it was not due, and Parliament never meant it to be due. No man who bought shares in the Company expected to get it, because if he had, he would have given, not £80, but probably £40, for his £20 shares. The position of the Company had been gradually improved, and yet they asked to have that made a stereotyped and guaranteed price, which they only obtained on account of the special difficulties in 1873, and on account of the ignorance of Parliament that prices were going to fall again as they had done. His suggestion was that the Corporation should have the alternative of 16 candles at 3s. 6d., 15 at 3s. 3d., or 14 at 3s. Another peculiarity of the Company was the strange provision about their not being obliged to supply public lamps unless they consumed 15,000 cubic feet, on some kind of average. Why should the Corporation of Brighton be worse off than the Corporation of any other place? Every other Corporation, and every Local Board in the kingdom, could put up gas-lamps of whatever size they pleased, and light them at what hour they pleased, subject only to the general legislation provisions; and why the Brighton Corporation should not be allowed to erect a gas-lamp at the entrance of some public building, frequented for three or four hours in the evening, he failed to see. The time had come when that ought to be repealed; and, inasmuch as the Gas Company now admitted that they must incorporate the Act of 1871, he only asked that they should incorporate it really and substantially, and not pretend to do so, while they kept alive a clause which, by the construction the Courts placed on those things, would supersede it, though an earlier one. He next came to the curious application of the Company to be allowed to sell all sorts of things. The 28th clause of the Bill gave the Company power to "purchase or hire, and let, sell, or otherwise deal in"—and that was the largest word of all—"and supply and fix, set up, alter, remove, and refix gas and other apparatus, engines, stoves, fittings, pipes, and other appliances for the warming or lighting of houses, buildings, and other places, and for the cooking of food, and all other purposes for which gas as lighting or heating agents are or hereafter may be used." The Corporation objected to the clause in detail and as a whole; and, should the Committee allow it to be retained, they would be obliged to carry their opposition elsewhere. It would mean absolute ruin to the tradesmen of Brighton, who could not carry on business at less than a profit of 10 per cent.; whereas the Company admittedly might, and probably would, carry on this business without any profit at all, purely for the purpose of encouraging an increased consumption of gas. He was not prepared to deny that that would be a benefit to the Company, and even to the public; but Parliament had always refused to grant powers to companies to go beyond their own business, and interfere with legitimate trade, except in cases where it was shown the thing could not be done otherwise. He strongly appealed to the Committee to strike out the 28th clause as a condition of passing the Bill; to reduce the price, increase the illuminating power, and allow only a moderate amount of fresh capital to be raised.

Mr. GRANVILLE SOMERSET, on behalf of the Hove Commissioners, said he was thankful to find that, by the admissions and obligatory concessions of the witnesses for the Bill, the points he had to submit to the Committee were very considerably narrowed, and it appeared to him in no way necessary that he should call witnesses. It was unnecessary for him to dwell on the points which had been so ably argued by Sir E. Beckett, and he would proceed at once to the matters in which Hove was more particularly interested. One very important matter was the question of testing the gas. By the Act of 1866, three hours notice of testing was required to be given to the Company; but he understood that that was now to be given up. Another thing which they wanted was a map of the mains in Hove, and it needed no witness to prove the necessity for such a map. In 1866 a map of the Brighton mains was conceded to Brighton, and that Act not only imposed on the Company the condition of providing a map, but of paying a penalty in case it was not properly provided. The promoters of the Bill were willing, it appeared, to concede that Hove should have a map, but they declined to agree to the penalty; but he submitted to the Committee that the one without the other would be illusory—the map could not be enforced without the penalty. A still more important point was the question of land. By section 6 of the Company's Act of 1866, they were forbidden to use at any time, in the parish of Hove, for the purposes of their undertaking, any land which they did not possess prior to the 1st of January in that year; but section 20 of the present Bill was admitted to be in direct contravention of clause 6 of the Act of 1866. Mr. Paddon had said it was never intended to be so, but there could be no doubt that, if the Bill passed in its present shape, it would enable the Company to put up their gasholders and other picturesque works all over Hove, just as if the Act of 1866 had never been passed. It was now understood that the clause of the Bill bearing upon the question of acquiring five acres of fresh land in Hove was to be altered as the Commissioners pleased, and therefore he was satisfied. He had originally advised his clients to oppose the clause altogether, but they did not wish to be unreasonable to the Gas Company, and it would be sufficient if the Committee

would insert words which would render the clause innocuous. As to the proposed increase of capital, the objections of the Commissioners, as stated in their petition, had not been in the least diminished, and he contended that the sum of £80,000 share capital, with power to borrow £20,000, which had been suggested by Sir E. Beckett as an outside limit, was not only liberal, but excessive for their near and immediate requirements. If the Committee were to grant them all the money and all the land they asked for, it was highly probable that they would be able to avoid coming to Parliament again for another 40 years. As to the question of price, he concurred entirely in the views urged by Sir E. Beckett; and, should the Committee approve the principle of the Bill, he trusted they would grant them, not only those concessions which the witnesses for the promoters had agreed to, but some other points of detail which he would not further refer to at that moment.

Mr. Willoughby, on behalf of the New Shoreham Local Board, said that the able speeches of his learned friends rendered it unnecessary for him to go over many of the points raised by the petition of that Board. The substantial point which he was there to argue was, what would be the future position of New Shoreham, and the outlying districts, in regard to the Gas Company? The Company formerly had branch works in Shoreham, and supplied the district at the uniform rate of 3s. 6d. For reasons of their own they subsequently gave up those works, but continued the charge of 3s. 6d. until 1873, when they applied to Parliament, and, on the strength of the increased price of labour and coal, obtained power to increase that charge to 4s. 6d. Shoreham, unfortunately, was not represented at the parliamentary inquiry of 1873, and, therefore, its interests were not protected. The price had remained the same up to the present time, whereas in Brighton and Hove it had been reduced to 3s. 6d., which was inequitable, and never intended by Parliament. His contention was that there ought to be a uniform price of 3s. 6d., but if the Committee did not go so far—if they thought that, for reasons which had been brought forward, there should be a distinction between Brighton and Hove and New Shoreham—then he asked the Committee to do the same as was done in 1873, and make a difference of 6d. only. Another point was as to the appeal to the Board of Trade. Why should one part of the district be placed in a worse position than another part? A gas company took a district as a man took his wife—for better or for worse—but the principle which the Company seemed to contend for was that because there was not such a quantity of gas consumed in Shoreham and Portslade as there was in Brighton, the former ought to pay more. The whole district ought to be taken together, and when they said that if they supplied at 3s. 6d. they would be doing an injury to Brighton, the converse case might be brought forward, because they were really doing an injustice to Shoreham and the surrounding districts by not supplying the gas at the same rate as at Brighton. The Legislature had over and over again denounced the system of differential charges, and so had the Court of Common Pleas. Railway companies had tried to charge people higher rates in certain districts, but the Legislature had said, "You shall not do that; if you go to a district you must serve all alike." A clause ought therefore to be inserted, giving the Shoreham Authorities power to apply to the Board of Trade to compel the Company to act in the same way towards them as they did towards Brighton and Hove.

Mr. Michael: How do you construe the 4th section? It seems to me you have that power already.

Mr. Willoughby said, in his view, the provisions were not strong enough. It seemed to him to apply only under certain circumstances, and did not go so far as he considered necessary, and he therefore asked the Committee to place them in the same position as Brighton, so that they might go to the Board of Trade if they thought it necessary. There was one part of the case which appeared conclusive to show that the inhabitants of Shoreham ought to have what they sought—a reduction of price for the benefit of the consumers. It was admitted that the year 1873 was a period of depression, in which the Company were justified in applying to Parliament. In that year they made, by the sale of gas, £42,479; by the sale of coke, £15,488; by the sale of tar, £2700; giving a total of £68,188; and they paid for coals £31,000, and for wages £7500, making altogether £38,000; therefore the total profit would be £30,000. In 1875 they received by the sale of gas, £47,000; by the sale of coke, £8000; by the sale of tar, £3000—a total of £64,000; and in the same year they only paid £26,000 for coal and £7200 for wages, which was less than in 1873. In 1878 they received £55,800 for gas; for coke and breeze, £7700; for tar, £4000 odd; and they paid £26,000 for coals, and £7100 for wages. If these figures were compared, it would be seen that there was an enormous difference between the position of the Company in 1873 and 1878. If there was good reason to apply in 1873 for an increase, surely the converse applied now. In common justice and fairness the Company ought to revert to the same position they were in previous to 1873. The Legislature only intended that the charge should be exceptional, consequent upon a period of depression. It was never intended that the high charge should be persevered in unless the facts which warranted those exceptional circumstances still continued.

Mr. *Thomas Gates*, examined by Mr. Willoughby.

I am a shipowner at Shoreham, and Chairman of the Local Board. Formerly there were separate works at Shoreham, belonging to the Brighton and Hove Gas Company, and the consumers were supplied at a uniform price of 3s. 6d. Those works were subsequently done away with, and new mains were laid from Hove, but until 1873 the price remained at 3s. 6d. The Shoreham consumers were not represented at the inquiry in 1873, because they were not aware it was intended to increase the price. We have complained to the Company both as to the quality and price, and also of the want of proper pressure to the public lamps. Coal is now a great deal cheaper than it was some years ago, and there are no dues at Shoreham like there are at Brighton. The Company are only subject to the harbour tolls, which are 10d. per ton.

Mr. *J. E. Brown*, examined by Mr. Willoughby.

I am a shipowner at Shoreham. I heard the evidence given by the last witness, and agree with it. Preston is farther from the Hove works than Shoreham; but I have heard the Company are supplying there at 3s. 6d. I know the gas-works at Portslade, and am not aware of any objection to gas being stored there, except that it is near the sea.

Cross-examined by Mr. Clarke: I believe that Preston is joined on to, and is really a part of Brighton, which Shoreham is not.

Mr. O'Hara, on behalf of the Shoreham Harbour Trustees, said the two points at issue were the mode in which the groynes were to be made over the foreshore, and the preservation of the rights of way over the land proposed to be taken. In the interests of the public, it was desirable that the Harbour Trustees should be the controlling authority, and that Mr. Paddon might not be enabled, if he so thought fit, to put down a groyne at the extreme end of the property, and cause a waste as regarded the rest of the foreshore. If they put groynes in places beneficial to their own lands, they ought to take care that they did not injure the lands of other people. The Trustees further asked that, in the event of the Company not putting down the groynes, and so preserving the shore, they should be able to call upon the Company to do so, and in the absence of the work being done, to do it themselves, because they had a much larger interest than the Gas Company. As to the right of way, it was absolutely necessary. It was not to be supposed that the Shoreham Harbour Trustees were going to commit perpetual trespass upon the lands of the Gas Company, or do them injury; all they wanted was that those rights which they had under the Act of 1816 should be preserved to them, and that they might have such right of access for the purposes of their trust, under their Act, as they might think requisite. The Trustees were a public body, invested by Parliament with certain duties, and they, therefore, claimed that they should be protected by Parliament in the execution of those duties.

Tuesday, March 25.

Mr. Michael, in replying upon the whole case, said it must be evident to the Committee that the opponents of the Bill had practically conceded the preamble; but still he could not conceal the fact that there were various matters of a very important character which Sir E. Beckett had asked them to decide, and which, if decided against the Company, would so alter the preamble of the Bill that it would be rendered practically useless to the promoters. Underlying everything appeared to be the question of prices, although he would point out to the Committee that that was a subject which was not dealt with at all in the Bill. He did not see what the opponents had to do with the new capital, and if the Committee reduced the price, the dividend upon the large sums which had been already subscribed would be not only seriously threatened, but absolutely destroyed. It would be evident, therefore, that if, in considering the preamble of the Bill, they were to raise the whole question of capital, price, and illuminating power, and also the question of expense in the manufacture and supply of gas, they would be opening up very serious issues. He ventured to think that the whole conduct of this Company was such as to entitle it to the favourable consideration of any Parliamentary Committee. Originally established at Hove, they had carried on their works without the serious complaints which, as a rule, attached to large manufacturing companies of the kind. Of their own free will they incurred great responsibilities and expense in removing from Hove to the site of the present works, and they now asked, under the obligations imposed upon them by Parliament, and in order to meet the necessities of the supply and the natural growth and increase of the district, to acquire powers which were absolutely necessary to enable them to carry on their business for their own and the public advantage. It was quite true that until the Act of 1871, unless there were special enactments in any of the private Bills, there was no obligation upon a gas company to supply gas; but in that year the law of the land decided that gas companies should be in the same position as ordinary trades. Under one of the Standing Orders of Parliament—technically known as the auction clauses—a company who were paying their maximum dividends had no interest either in raising additional capital, or in extending their area of supply or the quantity of gas supplied. They would never try to extend themselves into new districts, because their full profits were assured by their present community, and for that reason it must be apparent that new capital could not benefit the Company as it at present stood. It was the exigency of being called upon to supply an increased district, which imposed upon the Company the responsibility of extending their works, and hence also the necessity of raising additional capital. It was also pretty certain that, as the shares would be placed upon the public market, the consumers would be in no way prejudiced by any increase in capital which the Committee might sanction, because the value of the shares would be well known, and only the fair market price would be given for them. In fact, to put the matter another way, the new capital would in no way affect the present Proprietors, and any benefit which arose would go into the hands of strangers. The advantage of new capital to the existing Shareholders was simply that of earning, in a comparatively safe way, something more than they would in the stocks of the country—having a larger dividend for a less security. It was clear, therefore, that there could be no temptation on the part of the Company to spend a single penny more than was absolutely necessary on new works; and, so strongly had that fact been impressed upon the mind of the Court of Referees, that where a mere increase of capital was asked for, they had ruled that it did not give a *locus standi* to any opponents. It was impossible to conceive a case in which capital could be spent except for the benefit of the consumer, and that being so, he thought the Committee would agree with him that it would not be a wise proceeding to compel a Company to come year after year to Parliament for an increase of capital. The Company were probably the best judges of what would be required; and, unless the Committee desired to impose upon the Company the expense and trouble of constantly applying to Parliament, it mattered very little whether they granted an additional £100,000 or £250,000, because the Company would not spend more than was necessary. Looking at the growth of the undertaking, the amount asked for was very moderate, and a considerable sum would have to be expended in works to prevent the property of the Company being altogether swept away. Sir E. Beckett made a good deal of the statement of Mr. Paddon, that £25,000 would be sufficient for the extra retorts, but the question of retorts was only a small part of the works to be carried out. There were a vast number of works, bringing up the total expenditure to £600 or £800 per million feet of gas made, which must be taken into consideration. It appeared in evidence that in most cases the demand for gas doubled in ten years, even if the population remained almost stationary; but here was a case where the population was growing rapidly, so that the demand would increase to an extent far above the usual increase he had referred to. All he wanted, however, to impress upon the Committee, was the fact that, whatever increase of capital they sanctioned, it could have no prejudicial effect upon the consumer. A much more important question which had been raised was that of price; and it was a very significant fact that, notwithstanding Sir E. Beckett called Mr. Spice, who was a very eminent Gas Engineer, he did not suggest to him that the price should be lowered, or that there should be increased illuminating power. Excepting a question as to the difference between two burners, Mr. Spice was not asked a single question upon that which was a most vital matter—viz., whether the Company were to have their profits confiscated by being deprived, by any possibility, of earning any profits in the future. The Company had what was called a maximum price—that was to say, under no circumstances could they charge more than 3s. 6d.

The Chairman: In certain districts?

Mr. Michael said that was so. He put entirely on one side the question of differential rate, because he desired to address the Committee on the price as affecting the main district. If, however, the principle of a differential rate in the outlying districts were adopted, it must be governed by the price in the main district. The present times were exceptional. Never before were coals, iron, and labour so cheap, and those were three things which governed the price of gas. The Company had placed themselves under most onerous obligations in accepting 3s. 6d. as a maximum, and that was strongly marked by the evidence which had been adduced—viz., that the Company only sold their shares to pay 6 per cent. because it was very justly felt that the moment coal, iron, and labour advanced, the 7 per cent. would vanish. Under those circumstances, he did not think the Committee would decide that there ought to be any reduction in price, and he had a further ground for saying that because either Brighton, Hove, or Shoreham might, under the existing Act, if they thought them-

selves aggrieved, have gone to the Board of Trade and demanded an inquiry, with the view to a revision of prices. They had not, however, done so, which proved that they really had no grievance under this head, and, therefore, no fair reason for fighting the Bill upon that point before the Committee. If there was no such power, he admitted that might have been a reason for those public bodies opposing the Bill; but, having such an easy remedy, he thought they ought to have applied it, instead of troubling the Committee to consider it. As to the illuminating power which had been spoken of, they could not increase that without increasing the price, so he did not think the Committee would listen to a proposal of that kind. With reference to the question of differential rates, there was nothing more common in Gas Bills than a provision of that kind. It was really done with the view of charging an equitable rate to the consumer, and it was absurd to say that where the consumer was favourably situated he should be called upon to pay at the same rate as the man who lived in a remote part, where the conveyance of the gas to him caused a large expense to the Company. Some 60 or 70 Bills had been passed within the last few years, in which the differential rate had been inserted, and it would be an unjust thing if it was struck out of this Bill. With reference to the other powers sought by the Bill, all he could say was that the Company did not want to act as shopkeepers, but they thought that if they were allowed to supply gas-stoves, &c., it would be a great benefit to the public. Was any injury likely to arise from the letting out of gas-engines or gas-stoves? The whole thing originated from the desire of the Gas Company to induce the public to do that which was so largely for their benefit—viz., to use gas as a heating agent—and as it was well known that persons who would be likely to use it would stumble in the first instance because of the expense, it was for that reason the Company asked for the power to help the public by lending the apparatus. If it was desirable to keep a separate account of that branch of industry, it could be done; or, if there were any doubt in the minds of the Committee they might strike the clause out altogether. It was a matter that had originated from the electric light scare. Gas companies naturally feared that the electric light was going to displace gas, and joined in the cry of the foolish people outside, who were moved by the advent of the electric light, and thought their supply for lighting would so diminish as to necessitate their looking to other sources of profit. Happily, good sense, experience, and time had come to the rescue, and soon people had seen how totally without foundation all that talk was. The proposed clause would interfere with no tradesman; it would be a boon at the disposal of the consumer of gas; it would tend to do a great thing in the way of rendering sanitary improvements more accessible in houses; but, if the Committee had any doubts, they need not grant the powers sought for. Had a word, however, been said against the provision in the Bill as to land being required? Had it not been proved that large sums of money must be expended in extension of works? but what that amount was to be was entirely in the discretion of the Committee. Had it not been proved that the price was fair, or, if unfair, that there was a power of revision provided? Had it not also been seen that the differential rate was fair, looking to the rights of one class of consumers contrasted with the rights of the other class of consumers? What, then, remained of the Bill? Only for the Committee to pass the preamble, and say that the Bill was not only fair in the interest of the Company, but also in the interest of the consumers.

The committee-room was then cleared. After some time the counsel and parties were called in.

The Chairman said the Committee considered the preamble of the Bill proved, but there were one or two considerable modifications which would have to be made in the clauses. They thought the new capital should not exceed £150,000, with corresponding borrowing powers; that the trading clause should be struck out; and that the usual pressure clause should be inserted.

Mr. Littler intimated that the Bill made such great alterations, without the proper notice being given, that he should oppose it on the Standing Order in the House of Lords.

After some discussion, however, it was agreed to adjourn till the following morning, to give the Gas Company and the Corporation an opportunity, if possible, of coming to an amicable arrangement as to the clauses.

Wednesday, March 26.

Mr. Rees (the agent of the Brighton Corporation) said that his clients did not propose to trouble the Committee further.

Mr. Willoughby: I may say, so far as the Shoreham Local Board are concerned, that as the clauses raise no question of price, we cannot oppose them. We shall not contest them here, but reserve to ourselves the right of opposing them and the preamble in another place. I too, therefore, withdraw.

Mr. Richards inquired if the Hove Commissioners intended to withdraw.

Mr. Somerset: It seems to me that we are in this position. In the course of this inquiry certain concessions were made by the promoters of the Bill in cross-examination by me, and I hold in my hand the clauses which have been drawn up with the view of carrying out those concessions. I wish to know whether, because the Brighton Corporation have retired, it is intended that these concessions should be withheld? If that be so, I shall retire at once, and take my opposition to another place.

Mr. Richards said he thought that would be the best plan. It would be better for him to meet them there, because it appeared that Brighton and Hove were practically the same. Every single question that could be raised by Brighton could be raised by Hove, and it therefore meant, practically, a double fight upon clauses. His learned friend was perfectly right in saying that certain arrangements were made during the course of the inquiry, which were embodied in a clause, and those arrangements were assented to by the Corporation of Brighton; but, as Brighton had since retired, it was hardly fair that the promoters should be bound by them. If they were to fight these clauses hereafter, surely it would be more convenient that they should be settled when both bodies were represented. Brighton, however, had thrown the matter up in order to fight elsewhere, and it would really be for the convenience of all parties if Hove followed the same course, because then they would go to the House of Lords unprejudiced. At present the new clauses might be considered in the light of privileged documents, because they were drawn up with the understanding that all parties agreed, and one party to the agreement had since retired.

The Chairman: Has Brighton retired in consequence of any arrangement you have made with them?

Mr. Richards said not at all, but in spite of the concessions the Company were prepared to make.

Mr. Granville Somerset said he had had no communication with Brighton, either directly or indirectly. He was taking an entirely independent action, and there was no collusion whatever.

Mr. Richards said he did not suggest collusion, but he felt bound to say that the agents for the promoters met the agents for the opponents, and had gone before Mr. Warner, Lord Redesdale's legal adviser, when clauses to meet the views of all parties were agreed upon.

Mr. Cooper said, as the agent for Hove, he simply went to Mr. Warner with the view of modelling a clause which would introduce the Gas-Works Clauses Act into the present Bill.

The Chairman thought they had better proceed to the clauses, and see what the parties could do.

Mr. Somerset said that when the witnesses for the promoters admitted that certain things should be put in the Bill, he did not further examine them upon these points, and he therefore thought there would be no objection to inserting clauses carrying out the objects his clients had in view. The first clause he wished to propose was one embodying the Gas-Works Clauses Act of 1871. That clause Mr. Paddon said he should have no objection to, provided the Corporation of Brighton would also assent to it; and if it were not inserted here, Lord Redesdale would most assuredly insist upon it.

Mr. Richards said that the Acts of 1866 and 1867 clashed to some extent, and if the clause was inserted without the assent of Brighton, they might turn round in the other House and say that the promoters had exceeded their notices, and a preliminary objection might be taken upon Standing Orders. Brighton was not then present, and he wished to guard himself against putting anything into the Bill which was calculated to raise opposition in the other House.

The Chairman: Are you afraid of getting into the same difficulty as the Manchester Water Bill did last year?

Mr. Richards did not say it would be a fatal objection, but still it would add considerably to the cost of the Bill.

Mr. Somerset said no question could arise upon Standing Orders if the clause was inserted as he proposed it. If it were not inserted, the inhabitants of Hove would be placed in a very inferior position to those of Brighton. It was a clause proposed in the interests of the public, and, by the direction of the Legislature, ought to be inserted in every Act.

Mr. Richards having replied, the committee-room was cleared. On the parties being re-admitted,

The Chairman said the Committee had decided not to insert the clause.

Mr. Somerset said, that being the case, he should not trouble the Committee further.

The remaining clauses were then gone through and amendments made, and the Bill was ordered to be reported to the House.

Legal Intelligence.

BATH PETTY SESSIONS.—Thursday, April 17.

(Before Mr. E. C. Lowndes, *and a Bench of Magistrates.)*

CHARGE AGAINST A GAS COMPANY OF WILFULLY INJURING A ROAD.

The Bath Gas Company were summoned by Mr. Arthur Henry Lapham, as one of the Surveyors to the Chippenham Highway Board, under the 72nd section of the Highway Act, 1873, for having wilfully injured the surface of a road at Box, on the 4th inst.

Mr. F. H. Phillips appeared on behalf of the Highway Board, and said that the Company had been laying a gas-main from Bath to Box, and there had been several complaints as to the way in which the work was done, and possibly the Highway Board would require them to put the whole of the road in a complete state of repair, but that was not the present complaint. They had laid a service-pipe from the main straight across the road at right angles, and in filling it in had left a ridge 2 feet wide and 4 inches high, and Mr. Lapham had taken these proceedings in order to punish them for a contravention of the Act, as he considered they ought to have given him notice that they were going to break up the road, and that they ought to have filled it up properly, and not have left it in such a dangerous state.

Mr. *Arthur Henry Lapham*, examined by Mr. Phillips, said: I was driving along the road, and when at the bottom of Rudlow Hill I saw that the road had been broken up for a gas-main and a service-pipe at right angles to the road. It was about 2 feet wide and 4 inches high. I pulled up my horse, as I thought it dangerous to drive over it. I sent a letter to the Company, stating that, unless it was removed by the Monday, I should take proceedings; and, in reply, received a letter stating that "the work was done by competent workmen in the usual way." In consequence of my notice not being complied with, I applied to the Bench, and by their order, under the 73rd section of the Highway Act, on Tuesday, the 8th inst., I went down and found the place subsided a little, owing to the heavy rain, but I caused the principal obstruction to be removed that night. I then applied to the Bench for this summons. It was dangerous to the public to drive over. It has been a matter of contention with us as to the way the main was laid, and I had written to them about it, but not of any pipes going across the road.

By the Bench: If there had been any accident I should have been responsible.

By Mr. Petgrave, who appeared for the Company: I am not aware that the Company sent up a man. I was told by my man that the trench had not been touched. He was on the spot, and could see. The stuff sinks down, but it all depends on the nature of the ramming.

Mr. Petgrave: We filled up the place on Monday, as the man we sent up found it sunk, and he filled it up.

Mr. *Francis Mountjoy Elliott*, maltster, at Biddestone, who was driving with Mr. Lapham on the day in question, corroborated that witness as to the large mound across the road, and said, although he slackened his pace, they were jerked. He considered the mound excessively high.

Thomas Bull, foreman under Mr. Lapham, was also called. He said he had had 15 years experience, and thought the road was left very dangerous.

Mr. Petgrave said the Company had authority by a special Act of Parliament to lay down mains, and thought that if Mr. Lapham had gone to Mr. Phillips in the first case, this summons would not have been issued. No offence whatever had been committed. The summons, he said, disclosed no offence whatever, and he maintained that the Gas-Works Clauses Act clearly overrode the Highway Act.

Mr. Phillips said he was unaware that the Company had a special Act which applied to Box.

After some legal arguments, it was agreed that the summons should be amended, and that the proceedings should be under the 8th, 9th, 10th and 11th sections of the Gas-Works Clauses Act, 1847, "for not giving notice to the Surveyor that they were going to open the road, and that they did not open the road under the superintendence of the Surveyor, and according to his directions," and "that they did not reinstate the road in its proper condition."

Mr. Petgrave submitted that the Gas-Works Clauses Act did not apply in such cases as these, and that the notice had reference to the mains and not to service-pipes; that a notice was given to the Surveyor as to the opening of the road for the purpose of laying the main, that the work was done properly and by competent men, and that it was not a case in which the Company could be liable.

Joseph Pearce, examined by Mr. Petgrave, said he was a main and service layer in the employment of the Company, and had had about 30 years experience. They were particularly careful in this case, because he knew there had been grumbling in this parish, by Mr. Lapham, about the work not being properly done. It was left in a proper condition, and like they left it in Bath.

John Jefferies, a labourer in the service of the Company, corroborated.

Joseph Davis, chief inspector to the Company, having been called,

Mr. PHILLIPS submitted that under the Act the Company were bound in every case to give notice of their intention to open a road; and then, again, the main trench was completed six months ago, and therefore the notice given then would not affect this case. He maintained that, according to the Act, a notice should be served every time they were going to open the road, and their own witnesses had admitted no notice was given.

The BENCH, having consulted, said they considered the evidence as to the filling up of the trench somewhat conflicting, and they should dismiss that part of the case; but the contention that no notice had been given according to law had been proved, and the defendants would be fined 2s. 6d. and 17s. 6d. costs.

Mr. PHILLIPS applied for further costs, but the Bench declined to accede to his application, as they had given the verdict for the Company on the question of no notice.

SELLING COKE BY MEASURE.—At the Ashton Petty Sessions, on Wednesday, the 16th inst., a man named Joseph Fish was charged with selling coke by measure instead of by weight. The evidence showed that the defendant hawked coke at 3d. per bag.—Mr. T. W. Mellor, M.P., who was one of the Magistrates, remarked that the new Weights and Measures Act was one of the attempts made at reforming an old Act; but, instead of reforming it, Parliament had deformed it, and made it quite unintelligible to the general public. His own impression was that it was preferable to buy coke by measure rather than by weight, because, as it was not of the same specific gravity, purchasers had an advantage. Defendant had erred in ignorance of the law, and the case would be dismissed on payment of costs.

Miscellaneous News.

METROPOLIS GAS SUPPLY.

The following is Dr. Whitmore's report on the illuminating power, pressure, and quality of the gas supplied by The Gaslight and Coke Company to the parish of Marylebone during March:—

MARCH.	Illuminating Power in Sperm Candles.			Mean Pressure in Tenths of an Inch.		Mean Quanty. of Sulphur in 100 Cu. Ft.	Mean Quanty. of Ammon.in 100 Cu. Ft.	Sulphuretted Hydrogen
	*Mean of 24 Obser.	Highest.	Lowest.	Highest.	Lowest.	Grains.	Grains.	
Common gas . . .	17·03	18·30	16·41	30·74	17·01	13·33	0·40	No trace
Cannel gas	21·83	23·40	20·61	21·38	13·01	10·80	0·33	No trace

Mean of daily readings of barometer . . . 29·80
" " " thermometer . . . 59·74

* Each observation consists of ten readings of the photometer, at intervals of one minute.

Until very recently the gas supplied to this parish has been sent directly from three distinct gas-works—viz., the Fulham works, the Beckton and Bow works, and the Pimlico works, the last supplying only cannel gas—and these were never intermixed. With the object, however, of securing a supply of gas to each district served by the Company, which shall at all times be fully equal in illuminating power to the legal standard, and to maintain also a sufficiently high pressure, it has been thought necessary to mix the common gases supplied from the different works of the Company as circumstances may require. I have therefore, in this table, given the results of my examination of only two gases, which I distinguish by the names of common gas and cannel gas, and this plan I propose to adopt in future. The mean illuminating power of the common gas was equal to 17·03 sperm candles; it ranged between 18·30 and 16·41 candles. On twelve occasions it exceeded 17 candles, and on no occasion was it lower than nearly half a candle above the legal standard. The cannel gas, supplied only from the Pimlico works, gave a mean illuminating power equal to the light of 21·83 sperm candles. This gas also, on every occasion, exceeded the standard by half a candle, and very often the excess amounted to two and even three candles. The mean quantity of sulphur found in 100 cubic feet of the common gas amounted to 13·33 grains, and of the cannel gas to 10·80 grains. In neither of them did the ammonia amount to half a grain. The pressure of both gases was very good. On no occasion could the presence of sulphuretted hydrogen be detected by the ordinary tests.

METROPOLIS WATER SUPPLY.

The following is Dr. Whitmore's report on the composition of the water supplied to Marylebone during March:—

MARCH.	In Grains, per Gallon.							In Parts, per Million.		In Degrees.	
	Total Solid Matter.	Loss by Incineration.*	Chlorine.	Equal to Chloride of Sodium	Nitrogen as Nitrates and Nitrites.	Oxygen required for Oxidizable Matter.	Estimated Organic Matter.	Free Ammonia.	Albumenoid Ammonia.	Hardness.	Hardness after Boiling Fifteen Minutes.
West Middlesex	22·20	0·80	1·17	1·92	·092	·051	·408	0·00	0·08	13·9	4·4
Grand Junction	21·40	0·80	1·24	2·04	·107	·044	·352	0·01	0·058	16·2	5·3
River Thames at Hampton .	21·80	1·46	1·22	2·01	·147	·066	·528	0·01	0·13	15·7	4·6

* The loss by incineration represents the amount of organic and other volatile matters contained in the Imperial gallon (70,000 grains) of water. The total solid matter, *minus* such loss, consisted chiefly of carbonate of lime, with small quantities of other equally harmless salts.

The water of both Companies, as taken from the mains, was clear, bright, and well filtered. The amount of albumenoid ammonia in the water of the Grand Junction Company was unusually small. The water taken from the River Thames was slightly turbid, but considerably improved as compared with that taken in the two previous months.

THE THIRSK WATER-WORKS SCHEME.—On Saturday, the 12th inst., a largely attended meeting of ratepayers took place in the crypt of Thirsk Parish Church, to consider and decide what steps should be taken relative to the proposed application to Parliament for the supply of water to the town by the Thirsk District Water Company. The chair was occupied by the Vicar, and the following resolution was carried by 64 votes against 9:—"That it is expedient that the Bill to confirm the Thirsk District Water Provisional Order be opposed, and that the Vestry do have prepared and do present a petition to Parliament for that purpose, praying to be heard by counsel against the said Bill, and that a draft petition be adopted."

BEVERLEY GAS SUPPLY.

The Monthly Meeting of the Beverley Town Council was held on Thursday, the 10th inst.—the MAYOR (Mr. Croskill) in the chair—when the Gas Committee presented a report recommending that the sum of £900 be transferred from the profits of the gas-works for the past year, to the credit of the highway fund, and that, in addition, the Highway Committee have the use gratuitously of as much tar and ashes as they may require for street purposes. The following statement of account for the half year ending Dec. 31, 1878, was also presented:—

Gas-rentals			£2,704	19	0	
Less discount and allowances.			25	7	4	
			£2,679	11	8	
Meter-rents			125	0	4	
Public lamps			372	4	4	
Coke	£315	10	5			
Tar	197	15	0			
Sundries	9	5	6			
Ammoniacal liquor	170	0	0			
Fittings	128	4	2			
Weighing-machine account.	6	3	3			
	£826	18	4			
Less discount, leading, &c.	75	18	6			
			750	19	10	
			£3,927	16	2	

Coal and cannel, including freights, dues, and leading			£1,553	8	5	
Purifying			22	9	4	
Salaries			113	6	8	
Wages			433	11	4	
Repairs and maintenance of plant			104	17	1	
Ditto mains and services			6	9	8	
Public lamps, including cost of lighting			94	12	11	
Rates and taxes			30	8	11	
Stationery and printing			17	18	11	
Fittings			79	18	11	
Bank interest and commission.			64	10	7	
			£2,551	12	9	
Balance—profit.			1,376	3	5	
			£3,927	16	2	

Balance brought from revenue account			£1,376	3	5	
Stock of coal, coke, tar, &c., on hand, Dec. 31, 1878	£324	18	8			
New meters on hand	58	14	6			
			383	13	2	
			£1,759	16	7	

Interest on £6000 at 4 per cent.			£120	0	0	
Interest on £3000 at 4½ per cent.			67	10	0	
Interest on £500 at 5 per cent.			12	10	0	
Unpaid purchase money, £700, at 5 per cent.			17	16	0	
Second half of 11th instalment of loan of £5000, borrowed 1867			125	0	0	
Interest on £2500, balance of the last-mentioned loan			61	7	6	
First half of 3rd instalment of loan of £3000, borrowed 1876			89	7	11½	
			£493	5	5½	
New Works.						
New chimney & doors	£193	13	2			
New mains and services	37	16	10			
Meters	75	19	7			
			307	9	7	
Balance—net profit			575	8	4½	
Stock, &c., in hand			383	13	2	
			£1,759	16	7	

On the motion of the MAYOR, seconded by Mr. THIRSK, the report was agreed to, an amendment deferring for six months the consideration of the question of the disposition of the profits being supported by four members of the Council only.

In the course of the discussion of the question, it was stated that since the present Manager (Mr. Eli Bryan) was appointed, in July, 1875, the debt on their works had been reduced to the extent of £3355 10s. 1d.

Notice was given that at the next Town Council meeting a proposition would be made to reduce the price of gas 5d. per 1000 feet.

NOTTINGHAM CORPORATION GAS SUPPLY.

The Monthly Meeting of the Nottingham Town Council was held on Monday, the 7th inst.—the MAYOR (Sir J. Oldknow) presiding—when the following report of the Gas Committee was presented:—

The Gas Committee report that it is necessary to proceed forthwith, with considerable energy, in the enlargement of the gas-works. Since the last enlargement at Radford, the consumption of gas has overtaken the power of production, and unless substantial extensions are forthwith made, it will be impossible to supply the gas required within the district supplied by the Corporation. The maximum daily consumption of last season was 5,269,000 feet. The maximum daily consumption of the previous year was 4,558,000 feet, and of the year previous 4,342,000 feet. The fortnightly consumption has lately reached as high as 7,000,000 cubic feet over that of the corresponding fortnight in the previous year.

Your Engineer, Mr. Tarbotton, has, under the direction of your Committee, prepared the requisite plans for the extension of the Radford Gas-Works, which your Committee recommend to be at once carried into execution. The works will consist of a new carbonizing-house, which will contain 238 retorts, a new large purifying-house, and new meter and governor-house, together with the necessary purifying, condensing, and scrubbing apparatus, machinery, and liquor-tanks. The proposed extension will provide for the production of about 1 million cubic feet of gas daily more than the present works are capable of producing, and this increase will be necessary to meet the requirements of next year. It is also imperative to erect a new gasholder on a portion of the land which the Corporation have recently purchased from the Trustees of the Gregory Estate on the west side of the Midland Railway.

This work is proposed to be proceeded with immediately after the passing of the Bill which is now in Parliament, but should any difficulties arise to postpone the passing of the Bill this session, on the second reading, it is proposed to erect a new gasholder at Basford. The gasholder, if erected at Radford, will hold about 1¼ million cubic feet; if erected at Basford, a much larger one will be necessary, capable of holding, say, 1¼ or 1⅞ million cubic feet.

The probable cost of the proposed extensions at Radford will be about £28,000, and the probable cost of the gasholder, if erected at Radford, will be about £30,000, and if erected at Basford about £36,000.

These extensions will complete the gas-works at Radford, and fill up the land available for manufacturing purposes. Future extensions from time to time must take place at Basford and Eastwood.

Alderman BARBER moved the adoption of the report. He said that during the past year the quantity of gas made had been 910 millions, being an increase over the previous year of 89½ millions, or more than 10 per cent. The increase during the past five years had been an average of 7 per cent.; it had doubled in ten years. The present works were now only sufficient to supply the demand, and unless they at once proceeded to make extra storeage room for next winter, there would be very great difficulty in keeping up their regular and efficient supply. It was well known that if gas was made too hurriedly it was impossible that it should be of good quality. Ample time and ample storeage were required. He had gone very minutely into the whole of these matters, and he believed that the adoption of this proposal would be a thoroughly good investment for the Corporation.

Mr. BAINES seconded the motion, which was carried unanimously.

INVERCARGILL (NEW ZEALAND) CORPORATION GAS-WORKS.—From the profit and loss account of these works for the year ending Dec. 31, 1878, it appears that the total receipts from all sources amounted to £4844 15s. 5d.—£931 1s. 10d. of which was for the public lamps. The profit of the year, after paying all charges, and allowing a depreciation of 1 per cent., amounted to £168 5s. 9d.

WOLVERHAMPTON CORPORATION WATER-WORKS.

At the Monthly Meeting of the Wolverhampton Town Council last Tuesday—the MAYOR (Mr. John Jones) presiding—the Water-Works Committee presented the following report:—

The Water-Works Committee have pleasure in laying before the Council the duly audited balance-sheet and account of income and expenditure of the water-works for the year ending Dec. 31, 1878, from which it will be seen that during the year a profit of £3419 10s. 8d. has been made, being an increase on the profit of 1877 of £1717 7s. 5d.

Your Committee think it right, in order that the Council may test the results of the year's working, to compare it with that of the Birmingham Corporation Water-Works for 1878:—

	Birmingham.	Percentage to Income.	Wolverhampton.	Percentage to Income.
Gross income	£107,393 7 3		£20,066 19 6	
Expenses of working and management	£43,674 14 7	32·29	£7,348 12 8	36·62
Interest on capital	65,007 18 0	60·53	9,298 16 2	46·34
Net profit	7,710 14 8	7·18	3,419 10 8	17·04
	£107,393 7 3	100·00	£20,066 19 6	100·00

The percentage of cost of working and management to gross income of the South Staffordshire Water-Works for 1878 is 39·62.

Enclosed is a statement of the capital and income and expenditure accounts during the eleven years which have elapsed since the Corporation took possession of the water-works. The Auditors, in presenting the accounts, suggest that a large proportion of the undivided profits—say £5000—should be set aside as a reserve-fund for contingencies. Your Committee concur in this recommendation, and propose to set aside out of the accumulated profits the sum of £5000 as a reserve-fund, carrying over the balance of £1509 9s. 8d.

Your Committee are of opinion that the time has now arrived when they may safely recommend a reduction in the charge for water. The present rate charged for water for domestic purposes in the municipal borough of Wolverhampton is 1s. 6d. in the pound on the assessment to the poor-rate, which is equivalent to 6 per cent. on the rental, and water-closets are charged 20s. per annum where there is only one, and where there are more than one, 20s. for the first, and 10s. for each additional one. In lieu of these charges, your Committee propose that the domestic rate in the municipal borough be in future 1s. 3d. in the pound on the poor-rate assessment, equal to 5 per cent. on the rental, and that the charge for water-closets be uniformly 10s. per annum; and they hope, as the prosperity of the undertaking increases, hereafter to make proposals to afford still greater relief to the ratepayers. If these suggestions meet with the approval of the Council, the Committee will revise the scale of quarterly rates for domestic purposes within the borough accordingly.

The statement of accounts issued with the report shows that the capital of the Water-Works Company at the time of the sale to the Corporation, on the 1st of January, 1868, amounted to £210,661, inclusive of a debt of £86,246. At that time the expenditure incurred was put down at £210,327 10s., and, since then, an additional expenditure amounting to £19,594 7s. 3d. has taken place. The total amount of capital on which the Corporation pay interest is £228,145, made up as follows:—Original share capital, £100,000, at 4 per cent.; preference share capital, £24,415, at 5 per cent.; debentures, £94,530, at 4 per cent.; and loans, £9200, at 4½ per cent. The first two items constituted the sole capital of the old company, and the debentures and loans were raised by the Corporation to discharge the debts and provide for increased works.

As to the income, that has gradually increased year by year. When the Corporation purchased the water-works in 1868, the income amounted to £13,265 3s. 6d.; in 1877 it was £19,289 19s. 7d.; and last year it amounted to £20,066 19s. 6d. This latter sum was made up by £329 4s. 11d. derived from fittings, and £19,537 14s. 7d. from water consumed.

The total expenditure of the past year amounted to £16,647 8s. 10d., as compared with £17,587 16s. 4d. in the preceding year (which was the largest sum ever incurred), and £12,710 15s. 3d. in 1868. The separate items of expenditure during the past year are given as follows:—Repairs, £1249 12s. 6d.; engine expenses, £1781 5s.; coals, £2409 4s. 8d.; rates and taxes, £498 1s. 11d.; salaries, £1244 8s. 2d.; printing, gas, &c., £166 6s. 5d.; interest on loans, £4078 1s. 2d.; ditto on preference shares, £1220 15s.; and ditto on ordinary shares, £4000.

With respect to the profit, the accounts show that for each year, except for 1871, 1872, and 1875, when there was a loss for each of those years respectively, £619 15s. 6d., £859 7s. 6d., and £619 10s. 6d., the profits were—1868, £552 8s. 3d.; 1869, £141 16s. 3d.; 1870, £249 4s. 11d.; 1874, £38 9s. 11d.; 1875, £813 6s. 4d.; 1876, £1691 3s. 7d.; 1877, £1702 3s. 3d.; while that for the past year was more than double the last sum, being £3419 10s. 8d.

With regard to the comparative receipts, working expenses, percentage of working expenses to gross receipts, and the net earnings during the past ten years, it is shown that in 1868 the working expenses amounted to £4806 13s. 7d., and increased year by year until they reached £8313 15s. 5d. in 1877; but last year they declined to £7348 12s. 8d., the lowest since 1872, when they were £6767 13s. 10d. The percentage of working expenses to gross receipts for each year was as follows:—1868, 36·2; 1869, 40·2; 1870, 39·9; 1871, 42·7; 1872, 45·2; 1873, 46·9; 1874, 45·3; 1875, 43·3; 1876, 40·7; 1877, 43·1; 1878, 36·6. The net earnings have increased each year from £8456 9s. 11d. in 1868 to £12,718 6s. 10d. last year.

The total quantity of water distributed among consumers each year was—1872, 577 millions of gallons, and coals consumed 4835 tons; 1873, 603 millions, and 4872 tons of coals; 1874, 653 millions, and 5192 tons of coals; 1875, 713 millions, and 5759 tons of coals; 1876, 737 millions, and 5647 tons of coals; 1877, 716 millions, and 5660 tons of coals; and last year, 757 millions, and 5908 tons of coals. The quantity of coal consumed per million gallons of water distributed in 1872 was 8 tons 7 cwt. 2 qrs., and each year it decreased till 1876, when it was 7 tons 13 cwt. 1 qr., but rose to 7 tons 15 cwt. in 1877, and declined last year to 7 tons 16 cwt., the lowest of the quantity yet recorded. The cost of each million gallons of water distributed in 1873 was £27 5s. 4d., and last year it amounted to £21 4s. 6d.

In the municipal borough of Wolverhampton there is estimated to be 14,868 houses, of which 11,435 are supplied with water from the water-works. In the town of Wolverhampton alone there are, therefore, 3433 houses, the inhabitants of which are still dependent upon wells for their water supply. In addition to those houses in the town that are supplied with water from the water-works, there are the towns of Willenhall and Bilston, and other places, including Heath Town, Wednesfield, New Invention, and several more outlying localities.

Alderman FOWLER, in moving that the report be received, adopted, and entered on the minutes, said he had on many previous occasions to lay before the Council, at great length, reports of the Water-Works Committee, and to justify the various accounts which he had, together with those reports, to submit to them, with the expression of a hope that in the future the reports would be more favourable. He now had the honour and the pleasure of presenting to them a report which needed no comment at all from him. That report, in fact, told its own story, and he thought he might venture to say that that story was one which would meet with the approval, not only of the Council, but of the town at large. The Water-Works Committee had, during the year just ended, made a profit out of the water-works of £3419 19s. 8d., which was double the amount of the profit made the previous year. They proposed to form a reserve-fund of £5000, to meet future contingencies, and they also felt further justified, after carefully considering the matter in committee, to propose a twofold relief to the ratepayers in respect of the rates charged for the consumption of water—first, by a reduction of one-sixth, or from 1s. 6d. to 1s. 3d. per pound on the rental, which was equivalent to 5 instead of 6 per cent., as had been the rate charged since the time that the Water-Works passed into the hands of the Corporation, and as compared with 7 per cent., as it would have been had the works remained in the hands of the Company; whilst their second proposition was to reduce the charge for water-closets to an uniform rate of 10s. per annum. The Committee made these proposals tentatively, believing they were justified in doing so, and hoping that in the future they would be able to make still further reductions. At the same time, he would tell them that if, in the future, the Committee found their expectations not realized, and that the income was not equal to the expenditure, he should not shrink from coming before the Council, and, if necessary, asking their authority to retrace their steps. His own belief was, however, that, with proper management, the water-works, in the hands of the Corporation, would become not only a great power to the town, in a sanitary point of view, but would be the means of affording substantial pecuniary assistance to the town, as well as furnishing the ratepayers with an ample supply of pure water at a minimum cost. That day a proposal would be brought forward for the repayment of the last portion of the capital originally borrowed by the Corporation when they took to the works, the money having been re-borrowed at a much less rate of interest—viz., 4 per cent. He should add one other remark in justice to an old and tried servant of the Committee, and it was this: By the arrangement the Committee made last year with their Water-Works Engineer (Mr. Lyons Wright) in respect of his salary, they would this year effect a saving to the town of between £90 and £100. In other words, if the old arrangement had remained in force, Mr. Wright would have been entitled to receive an addition to his salary this year of nearly £100.

Alderman EDWARDS seconded the motion.

A long discussion ensued, during which Alderman Fowler and the Committee, as a whole, were very warmly congratulated on the success which they had attained.

Alderman MAJOR, however, in a lengthened speech, objected to the policy of reducing the charges, and, in terms of some severity, criticized the accounts and the inferences deduced from them.

Alderman FOWLER replied *seriatim* to the charges brought against the Committee, and to the questions which had been put to him.

The report was adopted.

THE CORPORATION OF COLCHESTER AND THE WATER-WORKS COMPANY.

A Special Meeting of the Colchester Town Council was held on Saturday, the 12th inst., "for the purpose of receiving a report from the Water Supply Committee, and, if deemed expedient, of entering into a contract for the purchase of the property, plant, machinery, &c., of the Colchester Water-Works Company." The MAYOR (Mr. T. Moy) was in the chair.

The Water Supply Committee reported that, as the result of their negotiation, they unanimously recommended the Council to acquire the property of the water-works for the town on the modified terms set forth in the following draft proposed agreement:—

1. The Company shall sell, and the Urban Sanitary Authority shall purchase, as from June 30, 1879, the undertaking and property of the Company, as the same now exists and is carried on.

2. The Urban Sanitary Authority shall accept and be content with the title of the Company in all respects as the same now stands, and shall raise no question or objection whatsoever touching the validity or sufficiency of the powers of the Company with respect to the said undertaking, or the property required by them in relation thereto, or any act, matter, or thing done or suffered by the Company for the purpose of, or in relation to the said undertaking.

3. The sum to be paid for the said purchase shall be ascertained by arbitration, in the mode provided by the Public Health Act, 1875, upon the following basis, that is to say:—
   (*a*) The Arbitrators shall ascertain the net annual earnings and income of the Company from every source for the year ending the 30th of June, 1879.
   (*b*) Such sums as shall be found to have been expended by the Company on working account, but to be as yet unproductive of income, shall not, in arriving at the amount of net earnings and income, be regarded by the Arbitrators as deductions to be made therefrom. The amount or proportion of sums so expended and unproductive shall be ascertained and determined by the Arbitrators.
   (*c*) Such ascertained net earnings and income shall be multiplied by 25 years.
   (*d*) £10 per cent. on the total product of such multiplication shall be allowed to the Company for the prospective value of the undertaking.

4. The Bill now being promoted by the Company shall, for the purposes of the said arbitration, be disregarded.

5. In addition to the sum that shall be awarded by the Arbitrators as the purchase-money payable for the said undertaking of the Company, the Urban Sanitary Authority shall pay to the Company all such sums as shall have been expended by the Company from any source on capital account from Sept. 30, 1878, up to June 30, 1879, but excluding therefrom the costs and expenses of and incidental to the present Bill; should the said Authority, however, adopt such Bill in Committee, the cost of the further prosecution thereof shall be paid by the Urban Sanitary Authority.

6. All mains, pipes, and other plant of the Company in hand, and not in actual use, on June 30, 1879, and also all coals and other consumable stores and articles then belonging to the Company, shall be taken and paid for by the said Urban Sanitary Authority at a valuation.

The purchase shall be completed on the 29th day of September, 1879, and as from the 30th of June, 1879, the purchase-moneys and valuations shall respectively carry interest at 5 per cent. per annum. All rents, rates, and other income accruing due up to the 30th of June, 1879, shall be received by and belong to the Company, who shall pay all expenses and outgoings up to that date; but as from the 30th of June, 1879, to the actual completion of the purchase, the undertaking shall be carried on by the Company for the benefit, and at the cost and risk of the Urban Sanitary Authority, on or before the —— day of ——, 1879.

Alderman PAPILLON, after some preliminary discussion, moved—"That subject to the Urban Sanitary Authority having the future conduct of the Colchester Water-Works Bill now in Parliament, it is expedient, and the Town Council, acting as the Urban Sanitary Authority, do hereby agree to purchase the property, plant, machinery, mains, and effects, and farming the undertaking of the Colchester Water-Works, upon the terms and conditions contained in the agreement annexed to the report of the Water Supply Committee, and that the Mayor be authorized to affix the corporate seal thereto, and to the contract to be based thereon, and as referred therein, and as soon as the same be prepared in exchange for the counterpart of each, to be executed by the Company of Proprietors of the Colchester Water-Works."

This motion met with opposition from one member only, and was put to the meeting and carried *nem. con.*

Mr. WICKS then moved, and Mr. COLE seconded—"That upon the Water-Works Company withdrawing their objections to the *locus standi* of the Corporation to oppose their Bill, the Corporation shall simultaneously withdraw any opposition to the same, subject to the Water-Works Company handing over to the Corporation the conduct of the Bill."

This was at once agreed to; and, an instruction having been given to have the agreement inserted as a schedule to the Bill, the Council adjourned.

RETFORD WATER SUPPLY.—The question of the supply of water for the town of Retford is, says the *Lincolnshire Chronicle*, now exciting a considerable amount of interest. A number of gentlemen, some of whom live in Rotherham, discovered in a field near the town, in which they had been conducting boring operations for coal, a valuable spring of water. They relinquished the coal scheme, and floated a company to supply Retford with water, Messrs. G. and C. H. Marshall, of Retford, being the Solicitors, and Mr. C. Tomlinson, of Hadley House, Rotherham the Engineer. They applied to the Town Council for permission to break open the streets in order to lay down the mains, and were refused; whereupon they introduced a Bill into Parliament. The Council, conceiving it would be better for the town to have the supply in their own hands, petitioned against the Bill. They started a counter scheme of their own, purchased (conditionally) land to the south-west of the town, near Grove, and in a small enclosure, just at the bottom of Whiney Moor Lane, commenced boring, the work being under the direction of Mr. Fairbank, Engineer, of London. The workmen have now reached a depth of about 170 feet, and there is every reason to expect in this particular spot a pure and abundant supply. Indeed, the geological stratum here is the same as that by the side of Leverton Road, a distance of two or three miles from where the private company bored—namely, red sandstone.

LOCAL GOVERNMENT INQUIRY AT MIDDLESBROUGH.

The Cost of Obtaining the Water-Works.

An inquiry was held at the Town Hall, Middlesbrough, last Wednesday, by Mr. C. N. Dalton, one of the Inspectors of the Local Government Board. The inquiry was with reference to an application made by the Middlesbrough Town Council for permission to borrow money under the Stockton and Middlesbrough Corporations Water-Works Act (1876) and the Middlesbrough Improvement Act (1877), with respect to the expenses incurred in obtaining the Water-Works Act, and also of obtaining the loan for the purchase of the water-works. Mr. Bainbridge (Town Clerk) and Alderman D. D. Wilson (Chairman of the Finance Committee) were present on behalf of the Corporation.

The Town Council asked for powers to amend the 30th section of the Middlesbrough Improvement Act of 1877, thereby enabling them to borrow the sum of £2696 9s. 9d., the expenses of obtaining that Act, and to capitalize the same. They also asked power to borrow a sufficient sum to cover their share of the expense incurred in obtaining the Water-Works Act of 1876, and of opposing the Water Company's Bill, and also of procuring the loan required for the moiety of the purchase-money of the water-works. If that power is refused, the whole of the costs and charges, amounting to several thousand pounds, will have to come out of the current revenue. The total solicitors costs for the promotion of the Water Act were shown to be £10,046 8s. 8d., and for the opposition to the Water Company's Bill, £2563 19s. 4d.; or a total of £12,610 8s. The witnesses and other general costs were—Paid by Middlesbrough, £5440 4s.; by Stockton, £4780 2s. 3d.; by the Water Board, £5821 18s. 2d.; total, £16,042 4s. 5d.—the two totals amounting to £28,652 12s. 5d., half of which the Middlesbrough Town Council wish to capitalize and borrow, repayable over a term of years. It was also desired to capitalize the sum of £10,482, the expenses incurred in obtaining the sum of £400,000, the amount of the precept served upon the Corporation on account of the water-works. Of the £400,000, the sum of £100,000 had been borrowed for 30 years at 4½ per cent., and £200,000 for five years.

The Town Clerk said he did not entertain any doubt that the Corporation would be able to borrow the remaining £100,000 for a term of five years, and the Council sought power to borrow the amount of the expenses incurred in obtaining these loans, repayable in ten years.

The Inspector said it was a novel application; but he quite saw that it would be a hard thing if the whole amount of these costs had to come out of one year. Unless, however, a Provisional Order was granted, and the matter put in the shape of a Bill, by the 1st of May, it would be too late.

Having obtained all the necessary information, the Inspector promised to report to the Local Government Board, and said the Corporation would no doubt learn the result of their application within a few days.

AUSTRALIAN GASLIGHT COMPANY, SYDNEY, NEW SOUTH WALES.

The following is the Eighty-sixth Report of the Directors of this Company, for the half year ended Dec. 31, 1878:—

The Directors have the pleasure of submitting to the Proprietors a very favourable report.

The half year's profits, after deducting bad debts, interest on borrowed money, the cost of repairs and renewals, working expenses, and all charges, amount, with the balance brought forward (£1649 14s. 9d.), to	£26,870 13 2
The Directors recommend a dividend for the half year of 7½ per cent.	18,555 18 7
Which will leave a surplus of	£8,314 14 7
Of which it is proposed to transfer to the reserve-fund	6,000 0 0
Leaving a balance to carry forward of	£2,314 14 7

Your Directors have recently engaged a new Engineer from London (Mr. Thomas James Bush), who had for several years held the situation of Assistant-Engineer at the Beckton station of the old Chartered Gas Company.

The excitement caused in England by recent improvements in electric lighting has, of course, not escaped the notice of your Directors. From all they can learn from the advices of their able and experienced Consulting Engineer in London (Mr. William Mann), and from the various reports of scientific men with which they have been furnished by nearly every mail, they see no reason to apprehend injury in that quarter to the interests of gas companies.

A great start has taken place within the past year in the use of gas for purposes other than lighting—such as cooking, heating, and motive power in the working of engines. Your own Company are now supplying upwards of 700 gas-stoves with gas throughout the city and suburbs, and their number is constantly increasing.

Revenue Account, for the Half Year ended Dec. 31, 1878.

Dr.		Cr.	
Manufacture, distribution of gas, and management	£25,990 2 9	By sales of gas	£56,886 4 0
Lighting and repairing public street-lamps	1,648 15 11		
Miscellaneous charges—interest, bad debts, &c.	4,026 6 11		
Half year's profit	25,220 18 5		
	£56,886 4 0		£56,886 4 0

Liabilities and Assets.

Sundry creditors—temporary loans	£98,700 13 7	Fixed investment—Land, buildings, and machinery at head station and the four out-stations (Haymarket, Woolloomooloo, Balmain, and Petersham); main and service pipes laid; implements and furniture	£326,002 18 4
Suspense accounts	604 19 2		
The Proprietors—Capital paid up	249,873 0 0		
Reserve-fund	19,491 2 9		
Reserve for replacing meters	4,508 1 6		
Dividends unclaimed	1,201 9 10		
Unappropriated profits	26,870 13 2		
		Floating investment—Coals, residual products, apparatus in store, meters, lamps, and pillars	52,361 13 5
		Sundry debtors	21,871 8 2
		Suspense accounts	546 13 4
		Cash	467 6 9
	£401,250 0 0		£401,250 0 0

Sale of Belper Gas Company's Shares.—On Wednesday, the 9th inst., Mr. Hopkins offered for sale, at the Lion Hotel, Belper, the remaining portion of the unallotted shares in the Belper Gas Company. Thirty-two shares realized £605 7s. 6d., or an average of £18 18s. 4¼d. per share.

Death from Suffocation by Gas.—On Saturday morning, the 12th inst., a young man named William Wilson, a mason in the employment of Mr. Gordon, builder, of Huntly, N.B., was suffocated by gas while in bed. Although no gas was used in the room where the unfortunate young man was sleeping, three separate gas-pipes met at the place where a meter originally stood, and one of these pipes, which was in a rather frail condition, had given way. About five o'clock on Saturday morning, one of the tenants smelt gas, and an hour later called Wilson to rise and go to his work. As he made no response, a neighbour entered the apartment, threw open the windows, and endeavoured to rouse deceased, but without effect. Medical assistance was called in, but all efforts to restore animation failed.

THE COMPARATIVE VALUES OF COAL AND COKE AS ENGINE FUEL.

The following "Return of Comparative Duties of Coal and Coke" used at the Borough of Dover Water-Works, compiled by the Town Surveyor (Mr. John Hanvey), will be of interest to many of our readers:—

Coal.

One Fortnight in February, 1878.

		Hours Working.	Water Raised. Gallons.	Fuel Consumed. Tons.	Fuel Consumed. Cwt.	Duty in Foot Pounds. Millions.	Mean. Duty. Millions.
First Week.	A low	122	6,562,746				
	B „	1	40,612				
	B high	12½	410,000	14	0	38·0	
	Total	135½	7,013,358				38½
Second Week.	A low	117½	6,320,677				
	B „	1	40,612				
	B high	12½	410,000	13	9	39·0	
	Total	131	6,771,289				

Remarks.—Superior Welsh steam coal, but without new expansion valves.

One Fortnight in November, 1878.

		Hours Working.	Water Raised. Gallons.	Fuel Consumed. Tons.	Fuel Consumed. Cwt.	Duty in Foot Pounds. Millions.	Mean Duty. Millions.
First Week.	A low	105¾	5,688,609				
	B „	46¾	1,698,611				
	B high	14	459,200	16	19	36·7	
	Total	166½	6,046,420				36
Second Week.	A low	95½	5,137,231				
	B „	39	1,633,878				
	B high	12½	410,000	15	15	35·2	
	Total	147	7,181,109				

Remarks.—Inferior Welsh steam coal; new expansion valve to B engine.

One Week in March, 1879.

		Hours Working.	Water Raised. Gallons.	Fuel Consumed. Tons.	Fuel Consumed. Cwt.	Duty in Foot Pounds. Millions.	Mean Duty. Millions.
—	A low	84½	4,532,060				
	B „	63½	2,578,962				
	B high	11	360,800	14	2	40·8	—
	Total	158¾	7,471,822				

Remarks.—Superior Welsh steam coal, and expansion valve to B engine.

Coke.

One Fortnight in February, 1879.

		Hours Working.	Water Raised. Gallons.	Fuel Consumed. Tons.	Fuel Consumed. Cwt.	Duty in Foot Pounds. Millions.	Mean Duty. Millions.
First Week.	A low	71½	3,846,199				
	B „	79	3,208,348				
	B high	10½	344,400	16	8	34·6	
	Total	161	7,398,947				
Second Week.	A low	76	4,088,268				
	B „	70	2,842,840				
	B high	13	426,400	16	9	34·6	
	Total	159	7,357,508				

Remarks.—Expansion valve to B engine.

Relative Cost.

Coal (Present Contract).		Coke (as per last Tender).
Alongside	16s. 9d.	
Wharfage	0 3	
Meterage	0 1	
Cartage, &c.	2 3	13s. 6d.
Town dues	1 7	
Total	20 11	

N.B.—Eliminating the results from inferior coal (November, 1878), and taking the foregoing coke (in February) and coal (in March)—late cargo—as fair average types, coal may be taken at a duty of 40 millions, coke at 34, or, weight for weight, 15 per cent. in favour of coal. The relative cost would therefore be—

Coke . . . 15·52s. } = about 5s. 5d. per ton in favour of coke.
Coal . . . 20·92s. }

Improved Public Lighting in Hull.—The Sutton, Southcoates, and Drypool Gas Company have erected eight large gas-lamps, and 25 smaller ones, similar to those now in use in the Waterloo Road, for the purpose of trying an experiment in improving the public lighting of Witham. The Company propose, as the old street-lamps become worn out, to replace them by others of an improved kind. The new lamps now erected will, by permission of the Local Board, be kept up till October next, when the experiment will be repeated. Several members of the Corporation and other gentlemen have tendered their congratulations to Mr. J. J. Runton, the Deputy-Chairman of the Company, on the success of the experiment, and also to Mr. Oldfield, the Manager, under whose superintendence the work has been carried out.

Death from Spontaneous Combustion of Coal.—On the 15th inst. an inquiry was held before Mr. E. B. Reece, one of the Coroners for Bristol, into the circumstances attending the death of Capt. Gatt, which had been caused on the previous Saturday by an explosion on board the steamship *Buteshire*, of Glasgow, lying in the Bristol Channel. Evidence was given as to the effects of the explosion, but it did not appear how it was caused. Over 200 tons of coal were on board, and it was supposed that the explosion originated from coal gas; but on an examination made of the hold of the vessel, no indication of fire or flame was found, and it was supposed that the accident was due to spontaneous combustion. The jury, after a short consultation, found that the Captain was accidentally killed, but gave no opinion as to the cause of the explosion.

THE LANCASHIRE COAL AND IRON TRADES.

(FROM OUR OWN CORRESPONDENT.)

During the past week a little extra pressure has been temporarily felt in the market for the better classes of round coal, suitable for house-fire purposes, owing to the colder weather and the stoppage of the pits for the holidays; and there has also been a little more stirring in gas coals since my last report. For cannel there is a tolerably good inquiry. This class of coal, owing to its limited production, maintains a fair price, one or two contracts having been recently placed for good picked Wigan cannel at about 20s. per ton at the pit. For ordinary gas coals, however, prices continue very low. Wigan four and five feet mines have been sold at 5s. 6d. to 6s. per ton; Arley could be bought at from 6s. 6d. to 7s. 6d.; and mixed gas coal and cannel at from 7s. to 7s. 6d. per ton at the pit. In many cases long forward contracts are being asked for, and some colliery proprietors have contracted for two years; but this seems to be the limit to which they are prepared to go. In other descriptions of fuel, quotations remain without change; but, with the exception of one or two of the best mines, there are scarcely any fixed prices in the open market; colliery proprietors, who have large quantities of coal to move—and there are some very heavy stocks in the district—being willing to take very low figures to secure good orders for early delivery. Common classes of round coal, for iron-making and steam purposes, continue as much a drug as ever, and engine fuel is still plentiful in the market, with the common sorts offering at extremely low prices. The average quotations at the pit mouth are about as under:—Best Wigan Arley, for house-fire purposes, 9s. to 9s. 6d.; second qualities, 7s. to 8s.; Pemberton four-feet, 6s. 6d. to 7s. 6d.; common house coal, 5s. 6d. to 6s.; steam and forge coal, 4s. 9d. to 5s. 3d.; good burgy, 4s. to 4s. 3d.; and good slack, 3s. to 3s. 3d. per ton.

There is some talk of a general reduction in colliers wages in the South-West Lancashire districts, but as yet nothing definite has been decided upon.

In the iron trade there has been little or nothing doing, and many of the works have been closed for the whole of the week. Where sales are made, very low prices have to be taken, and the quoted rates for Lancashire pig iron, delivered into Manchester, are now 46s. per ton for No. 3 foundry, and 45s. for No. 4 forge, less 2½ per cent. In the finished iron trade there is no material change. Since the quarterly meetings, a few orders have been placed in the district; but works generally are still very slack, and for Lancashire bars, delivered equal to Manchester, the quotations remain at from £5 10s. to £5 15s. per ton, with other descriptions of finished iron in proportion.

As an illustration of what gas plant can be bought at, I may mention that a contract has just been closed for 3, 4, and 5-inch gas-pipes, delivered equal to Heywood, near Manchester, at £4 17s. 6d. per ton all round; retorts delivered at the same place at 3s. 4d. per running foot, and fire-bricks at 50s. per 1000.

THE COAL AND GENERAL TRADE OF THE NORTH OF ENGLAND.

(FROM OUR OWN CORRESPONDENT.)

The daily papers have given very full reports of the circumstances of the great strike of pitmen in the Durham district. Down to Saturday night the strike was extending rather than otherwise. Writing on Monday, it is most difficult to say what the result will be. It may continue a week, a fortnight, a month, or even six weeks. No one can tell. The lowest computation is a fortnight from this time. The mischief that is being done, and will be done, before the end of the strike, is infinite. Joicey's and all the leading gas collieries were closed last week. There were only three gas pits open on Monday, and they may be closed in a day or two. The stocks of gas coals at bank at the time when the strike commenced are cleared away. Except from the three pits mentioned, and they are only of small moment, not a ton of gas coal is to be had. Steamers are going to Hull and Goole to load Yorkshire coals. Probably a good few gas coals will be taken to the South from the collieries on the Frith of Forth. All the gas colliery steamers which carry coals to London have been laid by, and the crews paid off since Wednesday. The London daily papers have been making a deal of fuss about the pitmen willing to work being terrorized over by gangs of men who would not allow them. It is all humbug. Before the strike commenced, the Masters Association believed that the gas collieries which have been doing full work, and the men receiving good fortnight pays would keep on. The Masters Association, however, by their action, made an impression upon the minds of the men that, in addition to a reduction of wages, they sought to break up the men's union. The gas colliery pitmen had promised their employers that they would keep at work. They might have done so, no doubt, but for the fact mentioned. There can be little question that the "Rebecca" gangs, made so much of by the London daily papers, were organized for a different purpose. That purpose was to give the men at the gas collieries a plea for leaving their employment, by saying that they were too terrified to continue doing so any longer. The "riots," as they have been described, have been more noise than anything else. When it was necessary to "squelch" them, the county police put them down without any difficulty; and half a dozen of their ringleaders having been captured and sent to gaol for four or five months, the whole thing dropped. The coalowners are very much blamed, in trading circles in the North of England, for not allowing the matters in dispute to go to arbitration. It is pretty clear that the difference between them and the men might soon have been rectified. Every one knows that, except at the best collieries, Durham coalowners are losing money, and any reasonable man of competent talent, who might have been appointed umpire, would have had little difficulty in arriving at the truth and equity of the whole case. But, as I have stated, the coalowners expected that the men would not turn out as they have done, *en bloc*. That is where the mischief has entirely arisen. Furnaces have been damped down in the Cleveland district, and the production of iron will be very much limited for want of coals. The chemical and other factories on the Tyne are also likely to fall into a similar condition. There is no probability, however, of the strike in any way interfering with the fire-clay goods manufactories.

TRADE NOTES FROM SCOTLAND.

(FROM OUR OWN CORRESPONDENT.)

The arrangements are now complete for the next half-yearly meeting of the West of Scotland Association of Gas Managers, which is to be held at Coatbridge on Friday next. In addition to the President's address, there are to be papers on "Analysis of Gas Coal," "Self-luting Retort-Lids," "Relieving Pulsation from Retorts," and "Twenty-candle Gas as the Standard for Scotland." The meeting promises to be a great success.

An ordinary meeting of the Town Council of Paisley was held last Tuesday, when various minutes of the Gas Committee were read, regarding the steps taken to secure the reconstruction of the roof that collapsed a few weeks ago at the gas-works. As reported by the Committee, the contract showed that the contractors were to keep the roof in order for a year. The Committee therefore called upon them to replace the roof, which they refused to do, as they considered that faulty construction was to blame for the collapse. Provost Murray had reported, at one of the Committee meetings, that as the contractors had employed an architect to ascertain what subsidence had taken place in the building, he had engaged another from Glasgow to report on behalf of the Commissioners. Ultimately, the contractors agreed to replace the roof if the Commissioners allowed them £100; but as two architects had reported that the fall of the roof was due to faulty castings in the struts, the Commissioners declined to accede to that request. They then threw themselves on the generosity of the Commissioners, and stated that they would reconstruct the roof, and hoped that a liberal allowance would be given for so doing.

At a meeting of the Wishaw Police Commissioners, held on the evening of Monday, the 14th inst., the submission appointing Mr. G. R. Hislop, Paisley, and Mr. M'Crae, Corporation Gas-Works, Dundee, to act respectively for the Gas Company and the Commissioners, was read and approved of, and the Clerk was instructed to send it on to the Gas Company's law agents, so as to get the gas-works taken over without delay by the Commissioners, under the Burghs Gas Supply (Scotland) Act.

Mr. Smith, Gas Manager, Hawick, has at present in progress some interesting experiments in public street-lighting with new burners. About ten days ago he had erected in High Street a lamp suitable for large burners. The first to be tried was one of Bray's 80-light "standard" patent slit-union burners, and the experiment was a very great success. Eleven of the ordinary street-lamps in the vicinity were extinguished, and their place was more than supplied. It should be stated that the lamp was placed against the wall, and that a reflector was used. The result may be judged of when it is mentioned that the light was quite effective at a distance of upwards of 220 yards, or one-eighth of a mile. The consumption of gas was only about 15 cubic feet, or about three farthings worth per hour. On the evening of Saturday, when Mr. Smith exhibited one of Sugg's Argands of 50-candle power at the same place, it threw out a most beautiful, silent, white flame, which was greatly admired; but the experiment would have been more effective had the lamp been in a central position. I understand that it is the intention of Mr. Smith to show some of the London Argands which are suitable for offices, dwelling-houses, &c. The cost of gas being so small, he is satisfied that it only requires a little time for their introduction into use.

The Water and Gas Investigation Committee of the Inverness Police Commissioners have resolved upon, and issued a very elaborate report upon the great discrepancies existing between the estimated cost of acquiring the gas and water supply undertakings by the town, and what has since turned out to be the actual cost. They conclude their report by remarking that they have reason to fear that the charges consequent upon the heavy unanticipated expenditure will not continue to be met without increasing the water and gas rates, and they recommend that the utmost possible economy be exercised in future; that the charging of expenditure to capital account, and consequent increment of the debt, be carefully watched; and that a committee should be appointed to procure information, and to consider and report upon a scheme for reducing the considerable charge on the rates for salaried officials, by means of the consolidation of offices or otherwise.

At the monthly meeting of the Dalkeith Police Commissioners, held on the 14th inst., it was agreed to borrow the sum of £5000, to meet all contingencies connected with the new water-supply works, including the cost of laying the piping and building the tower for the new water-cistern at Eskbank, &c.

The usual monthly meeting of the Galashiels Corporation was held on the same evening, when a discussion arose on the question of the disposal of the sewage and other refuse of the town, a number of letters from town clerks and others, in reply to a communication to them on the subject, being read. It was eventually resolved to obtain from a number of engineers competitive plans for a drainage system. At the same meeting a report was read from Messrs. Leslie, on what was proposed to be done with the Knowes Dean reservoir. They estimated the cost of making it water-tight at £1000.

Mr. Patrick Fraser, the learned Sheriff of Renfrewshire, has just sent a letter to the Clerk to the Paisley Police Commissioners, in which he characterizes the condition of the drainage of that town as simply disgraceful and discreditable, and makes certain suggestions for its permanent improvement. Provost Murray, as the head of the Local Authority, has expressed himself in very strong terms as to the impropriety of the Sheriff going beyond his judicial functions, and making either reflections or suggestions on the subject.

The Glasgow pig iron warrant market was irregular during the past week, but the fluctuations were within small compass. An effort was made to get up a little excitement over the strike in the Durham mining districts, but it did not meet with much success. The lowest quotation during the week was 42s. 9½d. cash, and the closing prices on Friday afternoon were:—Sellers, 43s. 1d. cash and 43s. 2½d. one month; buyers offering 1d. per ton less. Shipping iron was in rather better demand, particularly the special brands which are in favour in Germany. It seems that the ordinary classes of pig iron, however, are but little wanted, and are being sent freely into the public stores.

No change has yet begun to show itself in the general aspect of the Glasgow coal market. Orders continue to be very scarce for all descriptions of coal, and prices remain without quotable alteration. The spring trade does not yet show any signs of beginning.

WATER SUPPLY OF SOUTH AUSTRALIA.—Mr. Oswald Brown, Hydraulic Engineer for South Australia, has been engaged in maturing schemes for the supply of water to places in that colony either badly provided for, or altogether unsupplied. Several works are now in course of construction. A new reservoir is being made at Nelshaby for the benefit of Port Pirie. It will contain 23 million gallons, and the cost is estimated at £25,000. A tank is being built at Wooldunga, at an expense of £4500, for the supply of Port Augusta. This will hold 360,000 gallons, and it is to be completed in a few days. The sum of £47,000 is being spent on a reservoir at Taylor's Run, which will hold 41 million gallons, to be stored for the benefit of the residents of Kapunda, and also for railway purposes. This work is to be finished in November, 1879. A covered service reservoir is being made on the North Park lands, Adelaide, for the supply of that port, Semaphore, and other outlying districts. This work, which will cost £14,220, is in active progress, and will be completed by the middle of February, 1880. When it is finished, the districts mentioned will be supplied solely from this tank, and the city mains will be relieved during the daytime from the great draught at present made upon them by the lower districts. During the past year £20,000 has been spent upon the laying down of mains in the suburban districts, the extension of the water supply to which has been the chief cause of the low pressure of water at present experienced in many places. The water-works authorized by the South Australian Parliament last session were—Burnside, £9750; Mitcham, £13,068; and Glenelg, £30,580. The sum of £20,000 has also been provided in the Loan Act for water-works at Mount Gambier; but a special Bill, authorizing the construction of the work and the levying of rates, will probably be passed before the scheme is brought into operation. The projects at present under consideration include water supply for Koorings, Gawler, Mount Gambier, Quorn, and Glen Osmond.—*Engineering*.

Leek Gas Supply.—The Gas Committee of Leek have for some time past been urging the Board of Commissioners to provide additional gas storeage accommodation, and they recently decided to erect a new holder. Tenders were invited for a telescopic holder in two lifts of 30 feet each, the bottom one being 80 feet diameter. The tender selected was for over £2500. The contracts for excavating and constructing the tank have been let for about £1500. The Consulting Engineer of the work is Mr. Henry Lyon, of Manchester. As a sequel to this proposed extension, an additional discount of 6d. per 1000 feet for early payment has been decided upon. To consumers who avail themselves of the allowance, the net price of gas will now be 3s. 6d., 3s. 3d., and 3s. per 1000 cubic feet, according to the quantity consumed.

The Carriage of Coals to the London Gas-Works.—Our correspondent who sends us weekly reports on "The Coal and General Trade of the North of England" writes as follows on the above subject:—"I have alluded on two or three occasions to the experiments which were being made in the carriage of gas coals from the Tyne to the Thames, and to the above bridges gas-works. The practice has hitherto been for steamers carrying coals to London to discharge their cargoes alongside the derricks in the Pool. The well-known London correspondent of the *Newcastle Chronicle* —a gentleman very familiar with the gas trade of the Metropolis—thus describes the success of the scheme: 'It was proposed to the London Gas Company, whose manufacturing operations are carried on at Nine Elms, and after some hesitation and doubt as to its practicability, was accepted. Messrs. Palmer and Co., of Jarrow, on the Tyne, were commissioned to build two steamers, each with a carrying capacity of 1000 tons dead weight, the decks of which somewhat resemble, on a large scale, those of the keels so familiar to Tynesiders. The funnel of the engine is telescoped, so that it can be lowered when the vessels are passing beneath bridges, and the masts and spars are so arranged that they can be brought to the level of the bulwarks. It is now some eight months since these novel colliers brought their first cargo of coals from the Tyne, and the service has regularly continued since. They have gone to and fro during all the late severe weather, and have never once been subjected to any detention. In the months of January and February, when the Thames was covered with dangerous ice-floes, the *Vauxhall* and *Westminster*—as these steamers are named—worked their way through all impediments to the discharging crane at Nine Elms, while the ordinary lighters were lying idle and helpless in various parts of the stream. Attention has been turned to the matter by the success which has attended the project, and it is in every way likely that ere long we shall see a very considerable fleet of these curious sea-going coal barges plying between the Tyne and the Thames. They make remarkably quick passages, and sometimes go two journeys to the one of ordinary colliers, especially when the latter are detained at the derricks, as is often the case. On the 5th of last month the *Vauxhall* reached Nine Elms in the morning with 1000 tons of gas coal. She was discharged in a day, and again left the gas-works at half-past ten o'clock at night—making her way down the river in the dark through all the nine bridges. She returned to the Tyne, got another cargo, and had unloaded that by sunset on Monday, the 10th. She could have delivered her freight a day earlier, but Sunday being a non-working day, she had to lie at Gravesend till early on the morning of the 10th. In the same way the *Westminster* delivered a cargo of coals at Nine Elms on the 7th ult., and was back on the 13th with another load. This new mode of delivering their coals will, it is expected, effect an annual saving of several thousand pounds to the Gas Company, as it entirely does away with the necessity for paying derrick and lighterage dues.'"

Purification and Regeneration of Foul Lime.—The *American Gaslight Journal* for the 17th ult. contains a letter on the above subject, from Mr. E. S. T. Kennedy, of New York City, and from it we extract the following:—"The regeneration or re-burning of lime has been successfully accomplished in this country, and with a degree of success both surprising and gratifying to the parties engaged therein. Early in the year 1878, Dr. A. W. Wilkinson, Chemist of the New York Mutual Gaslight Company, began his experiments, and the first attempt was a grand success. It occurred to him that if crude lime, in the form of limestone, or rock, or oyster shells, could be placed in an ordinary kiln and thoroughly calcined, and rendered caustic lime, when the heat was sufficient to do the burning perfectly, why could not powdered lime be made into forms and treated in a like manner? Certainly it was only a matter of heat, and in placing them in a close kiln, the draught could be easily provided for by piling the material—if the forms could be made to bear the weight of those piled upon them without crumbling. He accordingly secured the use of a brick machine and a close kiln, and then several samples of lime, some of which were impregnated with sulphuretted hydrogen and ammonia, and others simply in the form of carbonate of lime. The lime was slightly moistened, and then made into good-sized bricks or blocks and laid in the kiln in rows, piled one above the other, with a space between the rows for ample draught. Heat was applied slowly at first, until the excess of moisture was driven out, after which the heat was increased, and after a certain number of hours the presence of carbonic oxide was observed in the main flue, just outside of the kiln wall. At this time he knew the heat was acting upon the lime throughout. The firing was continued as strong as possible until the carbonic oxide disappeared, when he decided that the kiln was ready to cool and the material to be removed. The material, when perfectly cool, was slaked, and not only was every particle of the lime thoroughly calcined, but it came out of the slaking-box as white as chalk; whereas some of the samples originally were almost as well loaded with tar as with the other impurities. Upon examination of the lime, before slaking, it showed innumerable white specks throughout, and these were found to be that part of the original limestone or oyster shells which the first application of heat had not reached, and the second burning had calcined every particle. The shrinkage of the mass in burning it was about 25 per cent. of its original bulk; but, upon slaking, every bushel of caustic lime produced 2½ bushels of hydrate of lime. So successful were these experiments, that patents were secured in this country and in England, and the New York Mutual Gaslight Company immediately availed itself of this great improvement. Two kilns, with a total capacity of 2500 to 3000 bushels, and all the necessary apparatus for manufacturing the bricks or blocks, were erected, and operations commenced early in September, 1878, since which time the re-burning of spent lime has continued unceasingly, and with great success, something over 70,000 bushels having been handled in this manner up to Feb. 1, 1879. All the developments in the experiment have been realized on the larger scale of working, and it is found that the regenerated lime does about one-third more work than any purchased from the manufacturers; and the cost of re-burning, including the labour of placing it again in the purifiers, is less than half the price of new lime, the new lime costing the New York Mutual Gaslight Company 6 cents per bushel delivered at their works, while the regenerated article, including every expense, costs less than 3 cents per bushel. In re-burning the lime, all offensive impurities are consumed in the kiln, owing to their all being combustible gases, and no odour whatever can escape into the atmosphere. It is the quick application of a burning heat, after the excess of moisture in the material is expelled, which decomposes the remaining moisture and carbon of the burning gases into carbonic oxide, which effects a calcination of every particle of lime. Gas companies can keep in store just the quantity of lime necessary to their working, and re-burn it as often as desired. The depreciation is not appreciable in re-burning carbonate of lime, and in that impregnated with sulphuretted hydrogen and ammonia. The formation of sulphide of calcium is only about 1 per cent. for every re-burning; the heat simply driving out impurities mechanically held with a slight chemical union."

Register of New Patents.

3980.—Quaglio, J. von, Stockholm, "*Improvements in purifying coal gas from bisulphide of carbon and other sulphur compounds.*" Patent dated Oct. 27, 1877.

As an essential for the removal of bisulphide of carbon and other sulphur compounds in coal gas, and eventually to transform such sulphur compounds into another compound, which can be easily separated from the coal gas, it is necessary to decompose them. For this purpose metals are used having a catalytic influence or action for decomposing the bisulphide of carbon and other sulphur compounds in the coal gas, and converting them into sulphuretted hydrogen. The metals and their compounds, or other materials, are as follows:—Platinum, either as coherent metal or spongy platinum, iridium, palladium, ruthenium, rhodium; also metallic nickel and metallic iron in fine powder. Clay balls may also be used, if drenched with a solution of the chlorides of platinum, iridium, or the other metals. One principal agent in effecting such decomposition is the metal platinum in either of the forms before mentioned; and for the accomplishment of this, one of the metals or compounds thus acting is laid in pipes or other suitable vessels connected with a heating apparatus, and in such way that they can be used alternately when the cleansing of one becomes necessary.

The form of the apparatus is not important, but it is preferred to make it in duplicate of cast-iron pipes, with three-way valves at each end, connecting it to the inlet and outlet pipes, so that when one of the purifying apparatus becomes foul, the valves may be turned, and the unpurified gas caused to pass through the other. The cleansing of the metal or metallic compound within the apparatus is effected by causing a current to pass through the pipes while the metal or metallic compound is in a heated state, and until the surface of the said metal or metallic compound is freed from any deposit.

The contents of the apparatus may be heated by fire fed with ordinary fuel or gas, or by hot air, or superheated water or steam. If either of these modes of heating is adopted, it is intended that the purifying metal should be inserted in the pipes in the form of numerous rolls or folds of foil, so that a large surface of metal may be presented to the gas. It is, however, preferred to insert a great length of platinum, or other metallic wire, insulated from the pipe, and rolled, coiled, or twisted into a zig-zag form, and to heat such wire by electricity, generated by one or more galvanic batteries, or by a magneto-electric engine or engines. The effect of the metal or chemical compounds depends upon inducing the hydrogen in the coal gas to combine with the sulphur in the bisulphide of carbon or other sulphur compounds in the gas, so that sulphuretted hydrogen results, which can then easily be separated from the coal gas in any of the common known and used methods.

The apparatus can be placed either before the purifiers, when the sulphuretted hydrogen resulting from the bisulphide of carbon and the other sulphur compounds are separated at the same time as the sulphuretted hydrogen coming from the retorts; or it can be placed after the first purifiers, and the newly-formed sulphuretted hydrogen may be separated by means of further purification. One of the results of the above process is that the carbonic acid is decreased, and, as a consequence, the illuminating power of the gas is increased.

3992.—Wirth, F., Frankfort-on-the-Maine, "*Improvements in apparatus for and in the treatment of ammoniacal liquids.*" A communication. Patent dated Oct. 29, 1877.

This invention consists in the gain of all the ammonia compounds contained in ammoniacal or gas water, whether they are free ammonia or combined with sulphur, carbonic, sulphuric, and muriatic acid, by the use of a set of three or more boilers, such boilers being placed on different levels, and only one heated by fire, but connected with the others by suitable pipes, with valves, &c., one of the boilers being charged with lime for decomposing the non-volatile ammoniacal compounds, this lime boiler being heated, and the contents agitated by steam or hot or cold air.

[The invention is not described apart from the drawings.]

4052.—Weyhe, W., Bremen, "*Improvements in gas motor engines.*" Application dated Nov. 1, 1877. (This invention did not proceed to the Great Seal.)

This invention relates to a construction of gas motor engine, wherein, by a peculiar construction of the engine piston, with ports and passages, and by imparting to it a combined rectilinear and rotary reciprocating motion, the admission of the explosive mixture of gas and air into the cylinder, the ignition thereof, and the discharge of the gaseous products of combustion, are effected without the use of a slide-valve.

[The invention is not described apart from the drawings.]

4067.—Brock, G., Vienna, "*Apparatus for lighting railway carriages and vessels with compressed gas.*" Provisional protection only obtained. Dated Nov. 1, 1877.

This invention relates to improvements in lighting railway carriages and ships with compressed gas, and in apparatus for the same, and for the production, compression, and storeage of the gas.

The lighting of railway carriages by colza, petroleum, and other oils, as hitherto practised, is objectionable for many reasons, and may with great advantage be replaced by a more simple, cleanly, and powerful source of light. Gas is certainly the best medium at present known, and it has already been applied to the lighting of railway carriages in England, America, Belgium, Italy, and Germany, in various ways.

The application of gas lighting to railway carriages is facilitated by the use of gas produced by mineral oils, the residues of tars in general, which gas, by reason of its superior lighting power per unit of volume to that of coal gas, is easier of transport. A difficulty in the use of compressed gas is the necessity for the employment of a regulator, which shall be quite unaffected by shocks or oscillations of the carriage in order to emit the gas from the receivers, where it is under a pressure of ten atmospheres, to the burners, at a low uniform pressure suited to its combustion; also the necessity for works for the production, compression, and supply of gas to the carriages, which works should not be liable to frequent interruptions for repairs, &c. The present invention avoids all these objections.

[The invention is not described apart from the drawings.]

4071.—Kirkham, T. N., Abingdon Street, Westminster, Hulett, D., High Holborn, and Chandler, S., Newington Causeway, "*Improvements in apparatus for condensing, washing, and purifying gas and other vapours.*" Patent dated Nov. 2, 1877.

This invention relates more particularly to the condensing or absorbing

washing, and purification of coal gas, but is equally applicable to the treatment of other gases and vapours, and it consists of a simple and compact arrangement of apparatus into which the gases or vapours to be treated are introduced, and caused to impinge against a large extent of surface or number of surfaces, arranged either in the form of a helix or other continuous incline, or in a series of shelves fitted one above another, and having a number of tubes extending through them or through the coils of the helix, as the case may be.

The gases or vapours to be acted upon, and which may be introduced into the apparatus either at the top or at the lower end thereof, as found most convenient, are caused to travel over the surface of the helix or over the surfaces of the shelves, and their washing and purification is effected by water or other suitable liquid admitted at the top of the interior of the apparatus, and caused to flow over the surface or surfaces, whilst the condensation of the gases or vapours is simultaneously effected by passing currents of air, or air and water, through the interior of the tubes, against the external surfaces of which the gases or vapours are caused to impinge in their course through the apparatus.

The liquid flowing over the surfaces, by being brought into intimate contact with the gases or vapours, absorbs some of the impurities contained therein, whilst other impurities are deposited upon the surfaces, and conducted by the liquid to the bottom of the apparatus.

4077.—Foulis, W., Glasgow, "*An improved dip-pipe for gas-works.*" Application dated Nov. 2, 1877. (Void by reason of the patentee having neglected to file a specification in pursuance of the conditions of the letters patent.)

This invention, which relates to an improved dip-pipe for gas-works, has for its object, on the one hand, to prevent the irregular or intermittent flow of gas into the hydraulic main, as well as to prevent or diminish the deposition of carbon in the retorts, and, on the other, to cause the flow thereof from the retorts into the hydraulic main to be continuous and regular. These objects are effected by the improved dip-pipe constituting the invention, and wherein the improvement consists in allowing the gas to pass into the hydraulic main through a number of small slits or perforations formed in the part of the dip-pipe which dips into the water and tar in the hydraulic main. The bottom of the dip-pipe may be closed, or it may be left open and increased in length, so as to increase the seal, and prevent the gas passing by the bottom of the pipe.

4112.—Bray, G., Leeds, "*Improvements in gas-burners.*" Patent dated Nov. 5, 1877.

This invention relates to gas-burners which are wholly or partly composed of one or more of the various kinds of clay or earth and minerals used in the potter's ware. This class of burners is known as the "non-corrosive burners."

The burners to which the invention relates are those having a slit across the head for gas to pass through and issue from. These are chiefly of two kinds—(1) those which are commonly known as the "bat's-wing" burners; and (2) those having the same kind of slit, and also a peculiar hollowed-out formation in the interior of the head, such burner being known as the "slit-union jet" burner, and producing a flame similar in shape to that of the union jet burner. The slit union jet burner has for many years been manufactured from brass, and recently of steatite, in its rock or unground state.

The invention consists—

1. In hollowing out the head of the burner (such burner being moulded from one or more of the various kinds of clay, or earths and minerals reduced to the form of clay) so as to produce, after being slit, the kind of burner named above as the "slit-union" jet burner. The clay for these burners may be of any suitable kind, and prepared or moulded in a more or less plastic or dry state.

2. In cutting the slit, which operation is, by preference, performed by means of a circular cutter in any burner requiring such slit, and having been moulded from clay, as before described.

3. In making cutters circular for cutting the slits in the heads of the above-mentioned burners, these cutters being composed of diamond, corundum, flint, or other suitable mineral substances, in a more or less pulverized state, and mixed with any suitable adhesive substance to cause the adherence of the articles composing the cutter.

4118.—Spence, P., Manchester, "*Improvements in the treatment of spent oxide of iron arising from the manufacture of gas, for the purpose of obtaining certain valuable products, and for rendering the said oxide again fit for use.*" Patent dated Nov. 5, 1877.

The material to which this invention refers is the hydrated oxide of iron now generally used for the purification of illuminating gas, and when, having become spent, it is no longer of use in purification, and has to be replaced by a new charge. In this condition, however, it contains valuable substances, some of which are extracted by this invention, and after they have been extracted, the oxide of iron is again rendered fit for use in the purification of gas.

In carrying out the invention the spent oxide is taken and placed in suitable tanks, and by water, either cold or hot, any compounds of ammonia it may contain are dissolved and washed out. This is needful for subsequent operations, but does not of itself constitute any part of the invention. The material is now turned on the floor, and allowed to drain until tolerably dry. Unslaked lime, equal in quantity to one-half of the spent oxide, is then taken and slaked into a fine dry powder, and with this dry powdered hydrate of lime the drained spent oxide is intimately mixed, and the whole placed in tanks, preferably of iron, each having a false bottom, also of iron, such false bottoms being provided with numerous small holes, and having a pipe (say, of 3 inches diameter) arising from under the false bottoms of the tanks to the surface, and through which water or solutions can be poured directly into the spaces between the bottoms and false bottoms of the tanks.

The tanks having been filled with the mixture, water is poured through the pipes until it rises over the material. This water may be heated to 150° or 160° Fahr., but should not be nearer the boiling point. The liquid overflowing or drawn off may be used at once, or passed into other tanks to strengthen it. In the former case it is run into a reservoir until clear, and it is then run into precipitating vessels, and has added to it a solution of perchloride of iron, with a slight excess of hydrochloric acid until no more precipitation takes place. The precipitate is prussian blue, which, after subsidence, is washed by renewed waters, and is then made either into pulp blue or dry prussian blue, as is well known; or, after the said washing or subsidence, a sufficient quantity of potash is added to it to decompose the prussian blue, and the solution so formed is boiled up until it is ready to crystallize prussiate of potash. The spent oxide having had all the prussiate of lime washed out, is now, without removing it from the iron tanks, covered with water, and submitted to boiling by blowing steam into the spaces between the two bottoms. A dark solution of sulphides of calcium is formed, and the boiling is continued until all is extracted. This solution is run into another series of tanks. After settlement, and when cold, hydrochloric acid is added to it until the liquor has a slightly acid reaction. Sulphur nearly pure is now precipitated, and this having been washed, drained, and dried, is fit for most of the purposes for which brimstone is used. The spent material in the tanks is now drained and dried, and is fit for being again used in the purification of gas.

4134.—Mills, B. J. B., Southampton Buildings, "*Improvements in the manufacture of gas for lighting and heating purposes.*" A communication. Patent dated Nov. 6, 1877.

The gas is obtained by distilling, either in the retorts generally used for the distillation of pit coal and wood, or in other distilling apparatus, bones, fœcal matters, and other animal matters, the temperature being varied according to the nature of the products to be treated, such temperature being generally by preference between 300° and 500° Cent. These different matters may be treated separately or mixed together with various other substances, such, for instance, as tan, sawdust, and coal refuse. The gas thus formed is cooled by passing through refrigerators, where the volatile products (ammoniacal waters and tars) are condensed; then the gas is either burnt directly, or conducted into gasholders in order to be supplied through pipes for consumption, or as compressed portable gas.

The gas obtained by the above operations, either purified or not, is composed for the greater part of heavy hydrochlorides of carbon, which give at equal volume a lighting power much superior to that of coal gas.

As soon as the matters submitted to distillation emit no longer any gas, the residuals are removed from the retort, taking care to place them in extinguishing chambers, or otherwise, to prevent their combustion, or to extinguish them previously in the retort by means of a jet of steam, which, on coming into contact with the carbon of the incandescent matters, becomes decomposed, its oxygen takes up the carbon, and thus forms carbonic acid of the carbonic oxide, the hydrogen being set free. This method enables a large part of the carbon of the residual to be utilized, if it is found desirable, and secures a not less considerable advantage in the production of gas suitable for heating purposes, dispenses with the extinguishing chambers, and avoids the removal of the matters in an incandescent state.

The patentee claims—

1. The manufacture of gas for lighting and heating purposes from bones, fœcal matters, and other animal matters, in the manner and by the means substantially as described.

2. The employment of water steam as a means of extinguishing the exhausted incandescent matters, thereby producing useful gas by setting free the hydrogen of the steam.

4139.—Lezius, H., and Zabel, H., Breslau, "*Improvements in self-closing valves or waste water preventers for general uses.*" (Provisional protection only obtained.) Dated Nov. 6, 1877.

This invention relates to improvements in self-closing valves or water waste preventers for general uses, and consists in placing or affixing a free valve within the body of a tap, that it may be lifted from its seat by pressure of water acting against it, after a pressure has been removed from the back of it, by the removal of a small valve, which is fitted in a chamber or passage leading from the back to the outlet, the valve being again free to close its passage on the small valve returning to its seating, which return may be effected by hand or by a weight, as desired. The closing and the pressure on the back of the valve is governed by a passage leading to it from the main supply, an adjustable key being fitted to regulate and determine the length of time that may elapse between the closing of the small valve and the closing of the free valve.

4154.—Howard, J., Erith, Wilson, A. F., and Kingdom, H. W. A., St. George's Road, Southwark, "*Improvements in automatic apparatus for regulating the flow of liquids under pressure and prevention of waste of water.*" Patent dated Nov. 7, 1877.

This invention is a modification of a water waste preventer valve shown in Howard's specification of Feb. 26, 1876, No. 799, but is not described apart from the drawing.

APPLICATIONS FOR LETTERS PATENT.

1341.—Wilde, R. H., Leeds, Yorks, "Improvements in cooking apparatus." April 4, 1879.

1342.—Fritz, G., Frankfort-on-the-Main, Germany, "Illumination lamps." April 4, 1879.

1384.—Leoni, S., New North Road, London, "Improvements in apparatus for heating and cooking and lighting by gas." April 7, 1879.

1410.—Haddan, H. J., Westminster, "Improvements in purifying and increasing the illuminating power of gas." A communication. April 9, 1879.

1450.—Hallewell, R., Blackburn, Lancs, "Improvements in gas-engines." April 12, 1879.

1454.—Bray, G., Leeds, "Improvements in street and other lamps and burners; also in means employed for increasing the illuminating power, brilliancy, and steadiness of gas-flames." April 12, 1879.

1500.—Linford, C., Leicester, "Improvements in gas-engines." April 17, 1879.

PATENTS WHICH HAVE PASSED THE GREAT SEAL.

3972.—Weatherhogg, G. W., Lambeth, London, "Improvements in gas motor engines." Oct. 9, 1878.

4097.—Hackney, W., Newport, Monmouth, "Improvements in regenerative gas furnaces." Oct. 15, 1878.

4102.—Wirth, F., Frankfort-on-the-Main, Germany, "Improvements in automatic gas-burners." A communication. Oct. 16, 1878.

4114.—Welch, E. J. C., Manchester, "Improvements in the method of dealing with electric currents, whereby they may be divided and distributed through any required number of circuits for lighting and other purposes." Oct. 16, 1878.

4163.—Aronson, J. N., Bedford Row, and Farnie, H. B., Great Marlborough Street, London, "Improvements in electric lighting, by applying an imperishable substitute for the carbons, such improvements being also applicable in part to other applications of electricity." Oct. 18, 1878.

4353.—Imray, J., Southampton Buildings, London, "Improvements in the treatment of ammoniacal liquor for the separation of ammonia compounds therefrom." A communication. Oct. 29, 1878.

2.—Williams, H., and Baron, J., Southport, Lancs, "Improvements in and relating to atmospheric air and gas motor engines." Jan. 1, 1879.

144.—Morgan-Brown, W., Southampton Buildings, London, "Improvements in the production of electric light, as well as in the materials and mechanism employed for that purpose." A communication. Jan. 13, 1879.

346.—Davey, H., Leeds, Yorks, "Improvements in water-meters, also applicable to water-pressure engines." Jan. 28, 1879.

PATENTS WHICH HAVE BECOME VOID

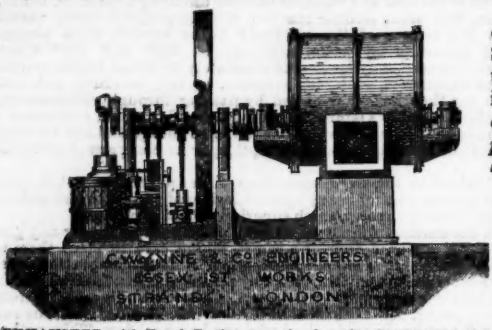
BY REASON OF THE NON-PAYMENT OF THE ADDITIONAL STAMP DUTY OF £50 BEFORE THE EXPIRATION OF THE THIRD YEAR.

1466.—Lake, W. R., "Improvements in the manufacture and utilization of combustible gases, and in apparatus therefor." April 6, 1876.

1520.—Wirth, F., "Improvements in gas-engines." April 10, 1876.

The GRAND MEDAL of MERIT at the VIENNA EXHIBITION, TWO MEDALS at the PHILADELPHIA EXHIBITION and TWO MEDALS at the PARIS EXHIBITION, have been AWARDED to GWYNNE & CO. for GAS-EXHAUSTERS, ENGINES, and PUMPS; Also 27 OTHER MEDALS AWARDED at all the GREAT INTERNATIONAL EXHIBITIONS.

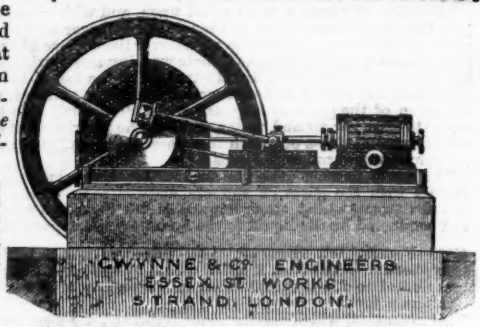
GWYNNE & BEALE'S PATENT GAS-EXHAUSTERS & ENGINES.



EXHAUSTER with Trunk Engine, capable of passing 210,000 cubic feet per hour.

The Judges report on the combined Exhauster and Steam-Engine exhibited at the Philadelphia Exhibition is—"*Reliable compact Machine, well adapted for the purpose intended, of excellent workmanship.*"

GWYNNE & CO. have made the largest and most perfect Gas-Exhausting Machinery in the world, and have completed Exhausters to the extent of 8,000,000 cubic feet passed per hour, of all sizes from 2000 to 210,000 cubic feet per hour.



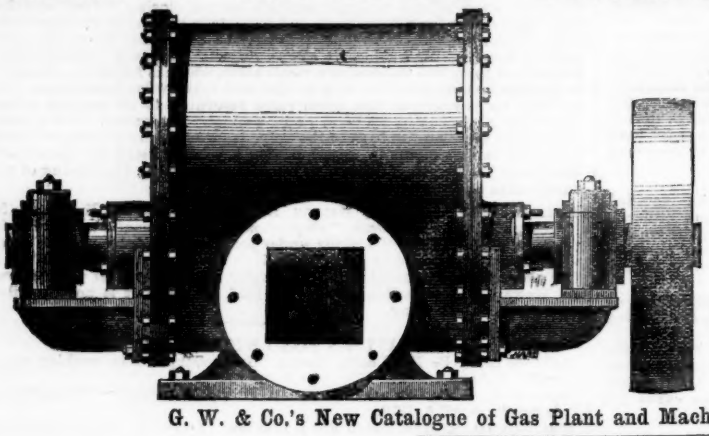
52,500 EXHAUSTER, with Horizontal Engine combined.

GWYNNE & CO. do not pretend to enter into a struggle with other makers in respect to cheapness. They have never sought to make price the chief consideration, *but to produce machinery of the very highest quality, and most approved design and workmanship.* The result is that in every instance their work is giving the fullest satisfaction. Numerous testimonials and references can be given to Companies using their Machinery for years past.

Exhausters, with or without Engines combined, can be made to pass the gas WITHOUT OSCILLATION OR VARIATION IN PRESSURE Regulators, Bye-Passes, Stop-Valves, Gas-Valves, Station Governors, and Gas Machinery of all Sizes.

PLEASE ADDRESS IN FULL, GWYNNE & CO., Hydraulic and Gas Engineers,
ESSEX STREET WORKS, VICTORIA EMBANKMENT, LONDON, W.C., ENGLAND.
Gwynne & Co.'s New Catalogue on Gas-Exhausting and other Machinery may be obtained on application at the above Address.

BEALE'S IMPROVED PATENT GAS EXHAUSTERS,



WITH OR WITHOUT
WROUGHT-IRON SPINDLES AND
ENGINES COMBINED.

GEORGE WALLER & CO.,
MAKERS OF
ENGINES, EXHAUSTERS,
INDEX AND DISC GAS-VALVES,
HYDRAULIC MAIN VALVES,
BYE-PASS VALVES,
TAR, LIQUOR, AND OTHER PUMPS,
SCRUBBERS AND PURIFIERS,
CONDENSERS, BOILERS, &c.

G. W. & Co.'s New Catalogue of Gas Plant and Machinery can be had on application.

PHŒNIX ENGINEERING WORKS:
HOLLAND STREET, SOUTHWARK, S.E.

TO GAS ENGINEERS.

D. BRUCE PEEBLES & CO.

Beg to call the attention of Gas Engineers to the fact that the novel and original feature in connection with PEEBLES' SYSTEM OF CONTROLLING THE ACTION OF GAS GOVERNORS is the loading or acting on the Bell by Pneumatic Pressure instead of Weights.

TAY WORKS. BONNINGTON, EDINBURGH.

THE IMPERIAL METER COMPANY'S
LAMP REGULATORS,

(PADDON'S PATENT) FOR PUBLIC LIGHTING,

As adopted in the following and numerous other Districts at Home and Abroad:—

Accrington, Barnet, Birkenhead, Bradford, Brighton and Hove, Burslem, Bury, Carshalton, Croydon, Darlington, Dukinfield, Egremont, Gloucester, Harrogate, Hastings, Heckmondwike, Imperial (Hackney), Leeds, London (Nine Elms), Longton, Newent, Rayleigh, Reigate, Shipley, Southampton, Southgate and Colney Hatch, Southport, Sowerby Bridge, Stockton, Stoke, Torquay, Tottenham, Wakefield, Western (Notting Hill, &c.), Whitchurch, &c., &c.

These superior Dry Governors, or Street-Lamp Regulators, are substantially made and sensitive in action, carefully tested, and adjusted to any required consumption per hour. No mercury or glycerine required. No detached cone to corrode or set fast.

Price complete, £1 10s. per dozen, packed and delivered.

KING'S ROAD, ST. PANCRAS, LONDON, N.W.

WANTED, by a Young Man, a Situation as GAS-FITTER, who thoroughly understands In and Outdoor Fittings. First-class references can be had.
Apply J. C. HARDY, Holbeach, LINCOLNSHIRE.

WANTED, by Provincial Firm, in or near Cannon Street, or in Westminster, use of Office for Address and occasional Appointments.
Address No. 544, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, by a Practical Mechanic (fair Draughtsman), a Situation to take full charge of, and to Repair all the Machinery, &c., in connection with a Gas-Works. Good references. Aged 30.
Address Z., care of Mr. Hawkes, 10, Great King Street, BIRMINGHAM.

WANTED, by the Advertiser, a Situation as SMITH and FITTER. Thoroughly understands Main and Service Laying, Meter Fixing, and all branches connected with Gas-Works.
Address E. P., care of Mr. Chiverton, No. 4, St. James's Street, Portsea, PORTSMOUTH.

WANTED, by a Young Man, aged 30, a Re-engagement as WORKING MANAGER of small Gas-Works (from 3 to 5 million). Fully competent in all branches of the business, Fitting, Retort-Setting, &c. First-class testimonials. Satisfactory reasons for leaving.
Address No. 545, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, a Situation as Manager or FOREMAN of Gas-Works. Dilapidated works preferred, that want Remodelling and Re-erecting. Thoroughly competent in the whole details of working, both indoor and out. Accustomed to large works. Salary moderate, or by results of working same.
Address ROBERT CROSS, Douglas Road, Parkwood Springs, SHEFFIELD.

LEIGHTON BUZZARD GAS AND COKE COMPANY.

WANTED, by the 30th of June next, a GENERAL MANAGER, thoroughly acquainted with the Engineering in connection with the Manufacture of Gas upon the most improved principles.
Applications, stating age, married or single, experience, and salary required, accompanied by testimonials of recent date, not exceeding four in number, to be forwarded to me on or before the 1st of May next, endorsed "Application for Manager."
The person elected Manager will be provided with a house and garden.
By order,
HIRAM HEARD, Secretary.
Leighton Buzzard, April 5, 1879.

A Young Dutchman wanted, to engage himself for some time for Building Gas and Water Works. He has worked already on several works.
Address No. 685, at the Royal Library of Mr. M. M. Couvée, at the HAGUE.

TRAVELLER wanted, for London and South District, to represent an old-established Gas-Meter Manufacturing firm.
Address No. 542, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

THE undersigned, now Assistant Manager of the Black Rock Gas-Works, Brighton, will shortly be open to a re-engagement.
Address WM. WRIGHT, Assoc. Inst. C.E., 2, Princes Terrace, Kemp Town, BRIGHTON.

ON SALE, by private contract, one 40 ft. by 18 ft. GASHOLDER, with Columns, Girders, Valves, and Balance-Weights complete.
Apply to Mr. BENJAMIN HAYNES, Secretary, Stretford Gas Company, near MANCHESTER.

TO BE SOLD, Cheap, Three Telescopic GASHOLDERS, two 60 ft. diameter and 20 ft. deep each lift, and one 70 ft. in diameter and 20 ft. deep. Only been in use eight years. May now be seen at work at the Effingham Street Gas-Works, Sheffield.
For price, apply to THOMAS PIGGOTT AND CO., Spring Hill, BIRMINGHAM.

THE Mitcham and Wimbledon Gas Company have FOR SALE a Cornish STEAM BOILER, made by Messrs. Piggott, of Birmingham. Size, 9 ft. long by 4 ft. 6 in. in diameter. STEAM CHEST, 1 ft. 9 in. by 1 ft. 6 in. in diameter; the same having been replaced by a larger one.
Apply to Mr. B. GREEN, Manager, Gas-Works, MITCHAM.

PURIFIERS FOR SALE.

FOR SALE—The Plates forming a Set of Two Purifiers, 12 ft. by 4 ft. 6 in. by 4 ft. deep, together with wrought-iron Covers, Lifting Tackle, Wood Sieves, Hydraulic Valve and Connections. The above are all equal to new, and very handy, requiring little floor space.
For particulars apply to GRAHAM ROSS, Gas-Works STONEHAVEN, N.B.

STAINES AND EGHAM DISTRICT GAS AND COKE COMPANY, LIMITED.

THE Directors of this Company invite TENDERS for the Supply of 3000 Tons of New Pelton GAS COAL, to be delivered at the Company's Works, situate on the southern bank of the Thames, in the Parish of Egham, and outside the City coal dues boundary. The coals to be delivered as follows:—400 tons in each of the months of October, November, December, and January next; 300 tons in each of the two following months of February and March; and the remainder as ordered before Sept. 30, 1880.
The tenders to state the price per ton for cash for each month's delivery, and for credit for three months.
The Directors will not accept any conditional tender, nor necessarily the lowest or any tender.
The tenders to be forwarded to me on or before the 29th of April inst., sealed and marked "Tender for Coals."
JOHN ANTHONY ENGALL, Solicitor and Secretary.
Staines, April 12, 1879.

FOR SALE.

THE Bury St. Edmund's Gas Company have FOR SALE the following GAS APPARATUS:—
One Circular Station-Meter, to pass 8000 cubic feet per hour, with Connections.
One 9-in. Governor, with Water Ballast, Inlet, Outlet, and Bye-pass Valves.
The above are in good condition. Further particulars may be learned on application to
JOHN M'CRAE, Engineer and Manager.

GAS-WORKS FOR SALE, situate within easy distance of extensive Collieries.
The works, which consist of Retort-House, Seven Retorts, Purifying-House, Two Purifiers, each 5 ft. square, with Dry Centre-Valve, Meter-House, Station-Meter, and Bye-pass Valve, Lime and Store Sheds, Condensers, and Gasholder to contain about 5000 cubic feet. Manager's house and offices are in capital condition.
The average make of gas is over one million cubic feet per annum, for which 8s. per 1000 is paid, and there is a steadily increasing consumption.
For further particulars apply, by letter, to H. T., 23, Paddington Green, LONDON.

TO MAIN LAYERS.

THE Sevenoaks Gas Company invite TENDERS for Laying a quantity of 12-in., 10-in., and 6-in. MAINS; also for Taking up and Re-laying other Mains and Services.
Lithographed specification, and conditions of the work required to be done, may be obtained (price 2s. 6d.) at the Office of the Company's Engineer, Mr. Alfred Penny, 20, Abingdon Street, Westminster, and at the Office of the Company, Sevenoaks.
Tenders to be sent addressed to EDWYN CRONK, Esq., Chairman to the Company, not later than the 29th inst.
April 15, 1879.

BURTON-ON-TRENT CORPORATION GAS-WORKS.

THE Gas Committee are prepared to receive TENDERS for the Purchase of the AMMONIACAL LIQUOR produced at their Works for One year, delivered into Contractor's tank trucks at the Gas-Works railway siding.
Payments to be made monthly, net cash.
Particulars respecting quantity, &c., may be had of the undersigned.
Sealed tenders to be addressed to the Chairman, and endorsed "Tender for Ammoniacal Liquor," to be sent in not later than the 3rd of May next.
The Gas Committee do not bind themselves to accept the lowest or any tender.
JOHN MUDIE, Engineer.

TO CONTRACTORS.

THE Directors of the Tottenham and Edmonton Gaslight and Coke Company beg to invite TENDERS for the Erection at their Works, Dyson's Lane, Edmonton, of a PURIFYING-HOUSE, to be 175 ft. long and 50 ft. wide, with Two Floors and a Composite Roof.
Drawings and specification can be seen by applying to the Engineer, Mr. W. H. H. Broadberry, at the Office of the Company, Willoughby Lane, Tottenham.
Tenders, endorsed on cover "Tender for Purifying-House," to be sent in not later than Thursday, the 1st day of May next, addressed to the Chairman of the Company.
By order,
JAMES RANDALL, Secretary.
Willoughby Lane, Tottenham, April 17, 1879.

STOKE CORPORATION AND FENTON LOCAL BOARD GAS-WORKS, STOKE-UPON-TRENT.

THE Joint Gas Committee are prepared to receive TENDERS for the construction, on the above works, of one Square PURIFIER, 20 ft. square by 5 ft. 2 in. deep, to be completed with all the necessary connections.
Drawings and specifications can be seen on application to the undersigned, at the Offices, Wharf Street.
Tenders to be sent in, addressed to the undersigned, on or before the 29th of April, endorsed "Tender for Purifier."
The Committee do not bind themselves to accept the lowest or any tender.
JOHN M'MILLAN, Engineer and Secretary.
Gas Office, Wharf Street, April 10, 1879.

TO MANUFACTURING CHEMISTS AND OTHERS.

THE Directors of the Staines and Egham Gas and Coke Company, Limited, are prepared to receive TENDERS for the purchase of the whole of the AMMONIACAL LIQUOR produced at their Works at Egham, for a term of One, Two, or Three years (at the option of the Directors), commencing from the 1st of June next. The pumping will be done by the Company's machinery.
Further information may be obtained of the Manager, at the Works.
Sealed tenders, marked "Tender for Liquor," to be sent to the Secretary, on or before the 29th of April inst.
JOHN ANTHONY ENGALL, Solicitor and Secretary.
Staines, April 12, 1879.

TO CONTRACTORS.

THE Gloucester Gas Company invite TENDERS for a Brick GASHOLDER-TANK 142 ft. in diameter and 35 ft. deep, to be erected at their new Works, Hempsted.
Drawings and specification can be seen, and forms of tender obtained, on application at the new Gas-Works, Hempsted, on and after the 15th inst.
Tenders must be sent in to me, and marked "Tender for Tank," on or before Tuesday, the 29th inst.
The Directors do not bind themselves to accept the lowest or any tender.
R. MORLAND, Engineer and Manager.
Gas-Works, Gloucester, April 3, 1879.

TO CONTRACTORS.

THE Directors of the Tottenham and Edmonton Gaslight and Coke Company beg to invite TENDERS for the Construction at their Works, Dyson's Lane, Edmonton, of Six PURIFIERS, each to be 36 ft. long, 18 ft. wide and 6 ft. 6 in. deep, and to have 16 in. Connections, wrought-iron Covers, and Lifting Apparatus.
Drawings and specification can be seen by applying to the Engineer, Mr. W. H. H. Broadberry, at the Office of the Company, Willoughby Lane, Tottenham.
Tenders, endorsed on cover "Tender for Purifiers," to be sent in not later than Thursday, the 1st day of May next, addressed to the Chairman of the Company.
By order,
JAMES RANDALL, Secretary.
Willoughby Lane, Tottenham, April 17, 1879.

MANCHESTER CORPORATION WATER-WORKS.

TO be SOLD by TENDER, a large Cast- Iron CISTERN, together with the Iron Beams, &c., connected therewith; now lying at the Gorton Upper Reservoir, four miles from Manchester.
The cistern is 51 ft. 6 in. long, 26 ft. wide, and 2 ft. deep, and equal to a capacity of about 16,684 gallons.
The cistern, &c., to be removed within 14 days from the date of the acceptance of the tender.
Tenders (which must be for 112 lbs. to the cwt.), addressed to the Chairman of the Water-Works Committee, and endorsed "Tender for Iron Cisterns," to be sent to Mr. Berrey, at these Offices, on or before Wednesday, the 30th inst.
By order,
JOSEPH HERON, Town Clerk.
Water-Works Offices, Town Hall, Manchester,
April 15, 1879.

THE Great Malvern Local Board invite TENDERS for the Supply and Erection of a Set of Four PURIFIERS, 10 ft. by 10 ft., with Centre-Valve, Condenser, Scrubber, and Gasholder.
Further particulars may be obtained, and drawings and specification examined, in the Office of Mr. J. E. Palmer, Surveyor and Gas Manager to the Local Board.
Tenders to be sent, under cover, addressed to the Gas Committee of the Malvern Local Board, and delivered at the Office of the Board on or before Saturday, the 26th of April inst.
The Board do not pledge themselves to accept the lowest or any tender. By order,
J. H. WHATLEY, Clerk to the Board.
Local Board Office, Malvern, April 10, 1879.

GAS MANAGER AND CLERK OF WORKS.

THE Directors of the Formby Gas Com- pany, Limited, require the Services of a competent Practical Man to act as CLERK of WORKS for their Works now being erected, and afterwards as MANAGER. A house for Manager is in course of erection.
Present population about 2000.
Any further information can be obtained from the Engineers, Messrs. Goodison, Atkinson, and Forde, Orange Court, 35A, Castle Street, Liverpool, or from me.
Applications must be sent to me, on or before noon of the 6th day of May, stating age, present and past employment, and amount of salary required.
FREDERICK GITTINS, Secretary.
30, Castle Street, Liverpool.

TO CONTRACTORS.

THE Directors of the Holyhead Gas Company are desirous of receiving TENDERS for the following EXTENSIONS:—
Two Annular Condensers.
One Circular Cast-Iron Scrubber.
Two Dry Lime Purifiers.
Roof for Retort-House.
Engine and Exhauster with Boiler complete; together with all requisite mains, &c., required.
Plans and specifications can be seen with the undersigned.
The Directors do not bind themselves to accept the lowest or any tender.
Tenders to be sent in to me on or before Wednesday, April 30.
EDWIN M. JONES, Manager.
Gas-Works, Holyhead, April 10, 1879.

FORMBY GAS COMPANY, LIMITED.

CONTRACT No. 3.

THE Directors of the Formby Gas Com- pany, Limited, are prepared to receive TENDERS for the Supply and Delivery at Formby Station (Lancashire and Yorkshire Railway, Liverpool and Southport branch) of about 6000 lineal Yards of Cast-Iron GAS-MAINS, with Socket and Spigot Joints, and special pipes in connection therewith.
Copy of specification, schedule and form of tender, and all information, may be obtained (on payment of two guineas, which will be returned on receipt of a *bonâ fide* tender) on application to the Engineers to the Company, Messrs. Goodison, Atkinson, and Forde, Orange Court, 35A, Castle Street, Liverpool.
Sealed and endorsed tenders to be sent to me before noon of the 6th of May.
The Company do not bind themselves to accept the lowest or any tender.
FREDERICK GITTINS, Secretary.
30, Castle Street, Liverpool.

TO GAS ENGINEERS, BUILDERS, AND OTHERS.

THE Directors of the Burgess Hill and St. John's Common Gas Company, Limited, are prepared to receive TENDERS for Constructing a GAS-HOLDER-TANK. Also for Making and Fixing a Single GASHOLDER, 40 ft. in diameter.
The drawings, specifications, and conditions of contract may be seen at the Company's Office, London Road, Burgess Hill, Sussex, on application to the Secretary, between the hours of 10 a.m. and 4 p.m. on any day except Sunday.
Tenders to be delivered at the Company's Office on or before Friday, the 9th of May next, endorsed respectively, "Tender for Gasholder-Tank," and "Tender for Gasholder."
The Directors will not bind themselves to accept the lowest or any tender.
By order of the Board,
S. NORMAN, Secretary.
Gas Company's Office, London Road,
St. John's, April 12, 1879.

GEORGETOWN (BRITISH GUIANA) GAS COMPANY, LIMITED.

NOTICE is hereby given that the ORDINARY GENERAL MEETING of the SHAREHOLDERS of the above Company will be held at the Offices of the Company, 30, Gracechurch Street, in the City of London, on TUESDAY, the 6th of May next, at Three o'clock in the afternoon precisely, to receive the Directors Report and the Accounts of the Company for the half year ending the 31st of December last, to declare a Dividend, to elect Directors and an Auditor in the place of those retiring by rotation, and to transact the General Business of the Company.
The Transfer Books will be closed from the 22nd inst. to the 6th of May next, both inclusive.
By order of the Board,
ALFRED LASS, Secretary.
Offices, 30, Gracechurch Street,
London, April 17, 1879.

THE Prescot Gas Company have for Sale, and which will be sold cheap, a quantity of GAS PLANT suitable for a small Gas-Works, consisting of Hydraulic Main, Mouthpieces, Ascension-Pipes, 6-in. Condensers and Washer.

Further information may be obtained from WILLIAM PRESCOTT, Manager, Gas-Works, Prescot, LANCASHIRE.

SULPHATE OF AMMONIA APPARATUS.

I am now prepared to Supply Plans of this New and Improved System for Making Sulphate of Ammonia. For terms, &c., address as below. I have constructed a small apparatus (glass) which shows the principle and illustrates the working of the larger plant admirably. I guarantee this apparatus to give a first-class result in sulphate if worked according to my instructions, &c. Price of small apparatus, c.o.d., £1 1s.

Address JOHN G. HARVEY, 31, Old Georges Street, CORK.

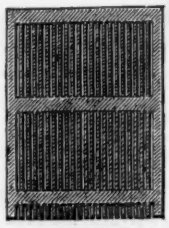
THE Hampton Court Gas Company have FOR SALE, One 40 ft. by 16 ft. GASHOLDER, with six Cast Columns and Wrought Girders, to be Sold very cheap, as the position is wanted.

Also the following PLANT, the whole of which is in excellent condition, having been removed for larger:—

One 8-horse Power Vertical Engine.
One 20,000 ft. Beale's Exhauster.
One 15,000 do. do.
Two Beale's Slide-Valves.
Two Waller's Disc-Valves.
One 8-in. Bye-Pass Valve.
One 20-in. diameter Exhaust Governor.
Three Riggers.
One 3-in. Cast-Iron Pump, Fowler's make.
One 2-in. do. do.
Driving Gear for the two Pumps.
One 3-in. Brass Valve Pump, with Driving Gear.
One Cast-Iron Scrubber, 12 ft. high by 5 ft. 6 in. diameter, with 8-in. connections.
Three 8-in. Donkin's Valves, 8-in. Pipes, Bends, &c., for connections.
Two Small Washers and Connections.

For further information, apply to Mr. E. PRICE, Engineer and Manager, Gas-Works, HAMPTON WICK.

R. DEMPSTER AND SON'S



WOOD SIEVES FOR PURIFIERS,

WITH TAPER OR PARALLEL BARS,

MADE BY SPECIAL MACHINERY.

SCRUBBERS FILLED WITH BOARDS,

On our approved principle, for the extraction of Ammonia.

Prices on application. References to First-Class Engineers.

ROSE MOUNT IRON-WORKS,

ELLAND, NEAR HALIFAX.

LONDON OFFICES: 2, SUFFOLK LANE, CANNON STREET, E.C.

CANNEL COAL.

For Analyses and Prices, apply to

ELLIS LEVER & CO.,

GAS COAL AND CANNEL CONTRACTORS,

6, PICCADILLY, MANCHESTER;

46, CANNON STREET, LONDON.

London Agent: Mr. J. FOX TURNER.

ECONOMY IN THE PRODUCTION OF GAS.

PLUTONIC CEMENT,

FOR JOINTING AND REPAIRING RETORTS AND OVENS *in* ACTION AND *out* OF ACTION.

A Pamphlet on the advantages of the above, with Modes of Application, References, Prices, &c., free by post, from the Sole Manufacturer,

WILLIAM RICHARDSON, Gas and Hydraulic Engineer, CHARLES HENRY STREET, and BISSELL STREET, BIRMINGHAM.

Now Ready, Price One Guinea,

PRECEDENTS IN PRIVATE BILL LEGISLATION

AFFECTING GAS AND WATER UNDERTAKINGS.

COMPILED BY MR. G. W. STEVENSON, C.E., F.G.S.

This Work contains information with regard to the practice of Parliament during the last fourteen years, in regard to most of the points on which differences arise in Opposed Bills for Gas and Water Undertakings, comprising—Authorized share and loan capital, Rates of dividend, Capitalization of profits, Term for the repayment of loans, Instances in which new shares are to be sold by auction and Exceptions to the Standing Order requiring new shares to be sold by auction, The limitation of back dividends, Illuminating power, Purity, Price, Notice before testing, The conditions under which the public supply of gas is regulated, Alteration of mains, Instances in which maps of mains are required, and All cases in which undertakings have been transferred, since 1845 in gas and 1865 in water, from Companies to Local Authorities.

In the Water Precedents will be found, in addition, The rates for a supply for domestic purposes, and the Rates for other than domestic purposes.

LONDON: WALTER KING, 11, BOLT COURT, FLEET STREET, E.C.

HONOURABLE MENTION. **J. E. WILLIAMS & CO.,** **PARIS EXHIBTIION, 1878.**

SOLE MANUFACTURERS OF THE

SPECIAL METALLIC OXIDE PAINT,

Largely used by Gas Companies, Corporations, Railway Companies, Ironfounders, and Machinists. It has the following qualifications and properties:—

EFFECTUALLY PREVENTS AND ARRESTS CORROSION.
HAS A FINE GLOSS, AND IS VERY DURABLE.
DOES NOT REQUIRE DRIERS LIKE OTHER PAINTS.
PROTECTS IRON FROM ACTION OF WATER.

IS NOT AFFECTED BY SULPHURETTED HYDROGEN.
FORMS A VERY HARD TOUGH (NOT BRITTLE) SURFACE.
WILL NOT CRACK, BLISTER, OR SCALE
IS NOT AFFECTED BY EXTREMES OF TEMPERATURE.

COVERS NEARLY DOUBLE THE AREA OF OTHER PAINTS.
(7 gallons or 1 cwt. will cover 1211 square yards of Ironwork.)
IS CHEAPER AND MORE ECONOMICAL THAN ANY OTHER.

VICTORIA PAINT WORKS, COLLYHURST, MANCHESTER.

LYON'S PATENT WEIGHING, MEASURING, AND REGISTERING MACHINES

ARE CONSTRUCTED TO COMPLY WITH

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AND ARE SPECIALLY DESIGNED TO MEET THE REQUIREMENTS OF

THE RETAIL COKE TRADE.

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N.B.—Now in use at most of the Principal Gas-Works

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CAST-IRON RETORTS, SOCKET-PIPES for GAS or WATER PURPOSES, FLANGE-PIPES for STEAM, RAIN-WATER PIPES and GUTTERS, HOT-WATER PIPES and BOILERS, and all requisite Connexions for same; also LAMP-COLUMNS, LAMPS, WROUGHT FRAMES, WROUGHT-IRON TUBING, &c., &c.

All kinds of Gas-Works Apparatus and General Castings made to Pattern or Drawing.

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GAS *v.* ELECTRIC LIGHT.

WIGHAM'S PATENT GAS-BURNERS

FOR

STREET LIGHTING, &c.

Speaking of these burners, erected on the Thames Embankment by Westminster Bridge, the *Daily News* says:

". . . . . A blaze of light is thrown out, which, in point of efficiency and brilliancy, far surpasses the large gas-lamps lately erected in Waterloo Place, *while even the electric lights are quite thrown into the shade.*"

SOLE MANUFACTURERS:

J. EDMUNDSON & CO., GAS ENGINEERS,

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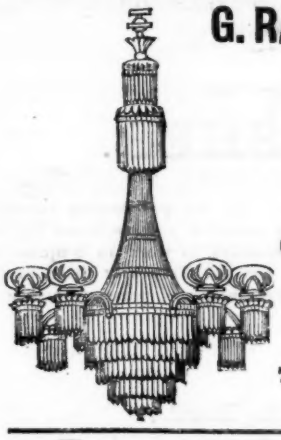

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ESTABLISHED 1850,

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SUITABLE FOR

GAS COMPANIES.

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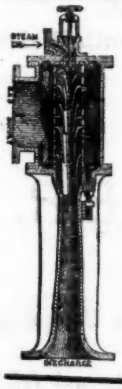

KÖRTING'S STEAM-JET EXHAUSTER.

IMPROVED CLELAND'S PATENT.

UPWARDS OF 300 IN USE.

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FOR PARTICULARS, APPLY TO

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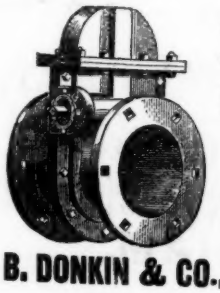
SOLE AGENT FOR ENGLAND AND WALES.

B. DONKIN & CO.'S

IMPROVED GAS-VALVES

WITH WROUGHT-IRON PINIONS.



List of prices, with full dimensions of all sizes up to 48-inch, to be had on application.

These Valves are proved on both sides to 30 lbs. on the square inch before leaving the works, and are kept in stock.

In ordering Valves, please state whether required for under or above ground, and if to be with flanges or spigots and sockets cast on, or with separate spigot and socket pieces.

ALSO SOLE MAKERS OF

J. BEALE'S NEW PATENT GAS EXHAUSTERS,

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STEAM-ENGINES FOR DRIVING GAS EXHAUSTERS,
VALVES FOR AMMONIACAL LIQUOR,
IMPROVED BRIDGE VALVES FOR REGULATING THE SEAL IN HYDRAULIC MAINS,
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OF

KING'S TREATISE

On the Science and Practice of the Manufacture and Distribution of

COAL GAS.

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SUITABLE FOR

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JOHN STANSFELD,

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GAS COAL. GAS COAL. GAS COAL.

WELLS, BIRCH, RYDE, and CO., Limited,

HOYLAND SILKSTONE COLLIERIES,

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This Company is now in a position to raise **2000 tons per day of REAL OLD SILKSTONE GAS COAL.**

"The quality of this Coal for Gas purposes, if equalled, is not excelled by any on record, and the Coke competes successfully with best Durham."—See *Mining Journal*, Aug. 11, 1877.

Prices quoted to any Railway Station, or F.O.B. Hull, Grimsby, Goole, Keadby, Liverpool, and Fleetwood.

Full particulars will be sent on application to above address.

1862.

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PATENT ANTIMONY PAINT.

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This light stone-coloured Paint, for which a Prize Medal was obtained in 1862, is free from certain defects of white lead. It does not produce any deleterious effect upon the health of those who use it, such as painter's colic, nor is it blackened by sulphur compounds in the atmosphere; while, from its less specific gravity and good body, it covers more surface, weight for weight, and, therefore, it is preferable and more economical than white lead.

It is peculiarly adapted for Gas-Works.

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This apparatus effects the most intimate contact between the liquor with which it is supplied and the gas passing through it, resulting in the complete removal of all particles of tar, increasing the ammonia strength of the scrubber and condenser liquor, and removing a large proportion of other impurities—notably, carbonic acid. The Washer is intended to work in conjunction with a scrubber. It occupies little space, and is inexpensive. It has been in successful constant use for nearly three years, does not become clogged with tar or corroded by the action of the liquor or gases, it gives three inches of pressure, and only needs a supply of liquor to keep it in regular action without any further attention.

For Particulars and Prices apply to

Messrs. DEMPSTER AND SONS, ELLAND, HALIFAX, for the North;

Messrs. BAILEY, PEGG, AND CO., Bankside, LONDON, S.E., for the South;

Messrs. WILLEY AND CO., Commercial Road, EXETER, for West of England and South Wales;

Or to the PATENTEE, 589, OLD KENT ROAD, LONDON, S.E.

IMPROVED
COMPENSATING GAS-METER.
HUNT'S PATENT.

This Meter supplies a want long felt, by putting an end to the loss sustained by Gas Companies through the overworking of their Meters.

These Meters can now be supplied in either TIN-PLATE or CAST-IRON CASES, and OLD METERS converted to this plan. GAS COMPANIES and CORPORATIONS will find it to THEIR ADVANTAGE to adopt these Meters.

EXTRACTS FROM REPORTS.

"I am able to report that the Meters have given in each test most satisfactory results."—*Mr. H. Sporne, City of London Meter Inspector.*

"I consider the arrangement is a great improvement upon the Meters in present general use."—*Mr. T. Jackson, Meter Inspector, Birmingham.*

"I would observe from the results of my testings that the Meters are a great improvement on the ordinary Wet Meters in general use."—*Mr. H. Airey, Meter Inspector to the Metropolitan Board of Works.*

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WET AND DRY GAS-METER AND GAS APPARATUS MANUFACTURERS,

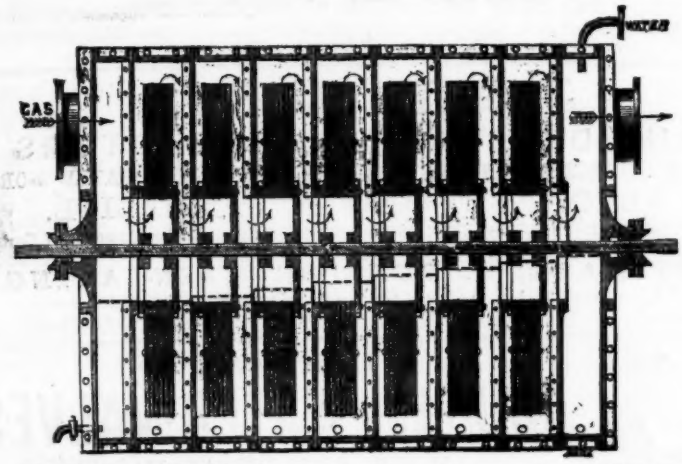
BELL BARN ROAD, BIRMINGHAM.

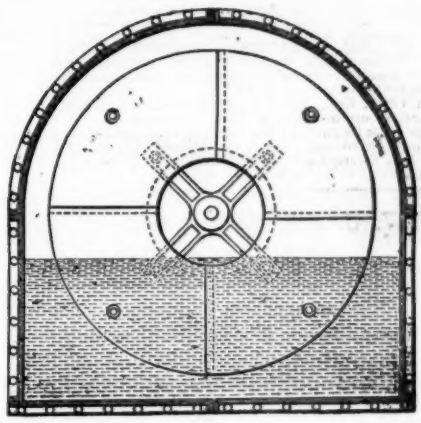
Established 1830.

THE

"STANDARD" WASHER & SCRUBBER.

[KIRKHAM, HULETT, AND CHANDLER'S PATENT.]





This Washer and Scrubber has been used for nearly two years on a large scale at the Works of The Gaslight and Coke Company, Bromley-by-Bow, at which station there are now several in operation and in course of construction. There is also one in use at the Pancras Station, King's Cross, of the same Company, which is purifying 1,500,000 cubic feet of gas per day. At the Gas-Works of the Corporation of Leeds, a large one has been erected, which is giving complete satisfaction. The Special Merits of this Washer are as follows:—

That it is a very effective Condenser, so that it is not absolutely necessary to reduce the temperature of the gas to 60°, or thereabouts, to make the Washer effective.

That the distribution of the liquor is made with unerring regularity.

That it occupies very small space, so that it can be, at little expense, effectually protected from extreme changes of the weather.

That the considerable expense of Coke or Wood, or other Scrubbing Material, is entirely saved, and that the great nuisance and cost of from time to time replacing the Scrubbing Material is avoided.

That, by the revolution of the discs, the quantity of water carried up by them, and tending continuously to fall, exposes a very large amount of fresh wetted surface to contact with the gas.

That it is particularly adapted for Gas-Works where Sulphate of Ammonia is manufactured.

That it is much cheaper than any other Scrubber that will do the same amount of work effectually.

That it is the only Washer suitable for purifying Gas from all its impurities by solution.

That it works with a minimum of pressure.

That it takes out every trace of Ammonia from the Gas in once traversing the machine.

That it requires very little outlay for foundations.

The following Testimonials show the opinion of eminent Engineers as to the capabilities of the Washer:—

(Copy.)

The Gaslight and Coke Company
Bromley-by-Bow, May 3, 1877.

D. HULETT, Esq.

Dear Sir,—In answer to your inquiries respecting the results of the working of your Patent Washer, I beg to state that I find it a very efficient machine. I have had it in operation for some time, and passed gas through it continuously at the rate of 100,000 cubic feet per hour, and obtained from it 11 gallons of 10 oz. liquor per ton of coal carbonized—results which appear to me very satisfactory for so small a Washer. It works very smoothly, taking but little power, and giving no pressure. I have it still in operation, and am perfectly satisfied with its working.

I am, dear Sir, yours truly, (Signed) W. B. WRIGHT.

(Copy.)

The Leeds Corporation Gas-Works,
York Street, Leeds, Dec. 6, 1878.

Messrs. KIRKHAM, HULETT, and CHANDLER.

Gentlemen,—The Scrubber-Washer erected by you at these works, and which has been in use for six months, has proved to be, so far as we have been able to test it, thoroughly efficient. We are at present making 32,000 feet of gas per hour, and are entirely dependent on this apparatus for the removal of Ammonia, and the **Gas is perfectly free from that impurity in the sixth chamber**, so that four chambers remain to deal with an increasing make of gas. Owing to insufficient condensers, the gas was in the summer admitted to the Scrubber at a temperature of 70°, but was reduced therein to 61°, or that of the atmosphere. The volutes are driven at the rate of four revolutions per minute, and, working at that speed, there is not the slightest difference between the inlet and the outlet pressure. Clean water supplied at the rate of 10 gallons per ton of coal carbonized is converted into liquor of from 10 oz. to 13 oz. strength **in once traversing the vessel.** The apparatus is extremely simple and compact, occupies but little space, and requires no foundation. I shall be surprised if it does not eventually become extremely popular.

I am, Gentlemen, yours faithfully, (Signed) HENRY WOODALL, Engineer.

(Copy.)

The Gaslight and Coke Company.
York Road, King's Cross, Jan. 14, 1879.

Messrs. KIRKHAM, HULETT, and CHANDLER.

Gentlemen,—In reply to your inquiry, I am pleased to say, the Washer which was put in action at this station in October last has quite fulfilled my expectations, as it confirms the experiments I made in May last with the smaller machine. Working at four revolutions per minute, **it takes out every particle of Ammonia**, while purifying more Gas than it was intended to do. I enclose particulars of a fortnight's working during our heaviest make, by which you will see that it yields the full quantity and strength of liquor, and works with little pressure. I am therefore quite satisfied with the machine, and trust it may meet with the success it deserves.

I remain, Gentlemen, yours truly, (Signed) JOHN CLARK.

The following Table shows the results of the working of one of these Washers, lately erected to purify 60,000 feet of Gas per Hour, at the St. Pancras Station of The Gaslight and Coke Company:—

1879.	Nos. of the Divisions and Strength of Liquor in each.										Water used per Ton of Coals.	Gas Purified per Hour, Cubic Feet.	Ammonia on Outlet.	Temperature.			Pressures.		Revolutions per Minute.
	1	2	3	4	5	6	7	8	9	10				Inlet.	Outlet.	Atmosphere.	Inlet, Inches.	Outlet, Inches.	
	oz.	oz.	oz.	oz.	oz.	oz.	oz.	oz.	oz.	oz.									
January 1	8½	6¾	5	3½	2½	1½	¾	¼	0	0	10 Gallons.	52,000	Nil.	77°	73°	48°	24	23	7½
,, 2	8¾	7	6	4½	3¼	2¼	1¼	¾	¼	0	10 ,,	57,000	Nil.	73°	66°	32°	21¾	20½	4
,, 3	9¼	8	6	3¾	3	2½	1½	¾	¼	0	10 ,,	60,000	Nil.	75°	68°	40°	23½	22	4
,, 4	9¼	7¾	6¼	4¼	3¼	2¼	1¼	¾	¼	0	10 ,,	65,000	Nil.	74°	68°	33°	24	22½	5
,, 5	9½	7	6	4	3	2½	1¼	1	¼	0	10 ,,	34,000	Nil.	77°	68°	35°	14½	14	5
,, 6	9¼	7¼	6¼	4¼	3	2¼	1½	1	¼	0	10 ,,	63,000	Nil.	72°	66°	27°	24	22½	4½
,, 7	11	9	7	5½	3¾	3	1¾	1½	¼	0	10 ,,	59,000	Nil.	74°	66°	31°	25	23½	5
,, 8	9½	7½	6	4½	3	2	1	¼	¼	0	10 ,,	78,000	Nil.	73°	61°	31°	28	26½	4½
,, 9	11	9	7	5	3¾	2½	1½	1	¼	0	10 ,,	82,000	Nil.	74°	67°	33°	27½	25½	5
,, 10	10¾	8½	6¾	5	3½	2½	1½	1	¼	0	10 ,,	66,000	Nil.	76°	64°	28°	28½	27	5
,, 11	12½	10	7¾	5¾	4¼	3¼	1¾	1¼	¼	0	10 ,,	61,000	Nil.	73°	64°	27°	26½	25½	5
,, 12	11	8¾	6¾	—	—	—	1¼	¾	¼	0	10 ,,	39,000	Nil.	74°	64°	27°	26½	25½	5
,, 13	13	10¾	8¼	6	4¾	3¼	2	1½	¼	0	10 ,,	78,000	Nil.	73°	65°	42°	28	26	5

(Signed) JOHN CLARK, Engineer.

For further particulars and testimonials, address

Messrs. KIRKHAM & HERSEY, GAS ENGINEERS, 21, ABINGDON STREET, WESTMINSTER.

SWANWICK CANNEL.

Illuminating power, 24 candles. Good Coke, 11¼ cwt. to the ton.

For analysis, prices, and references, apply to

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GAS COAL.

THE MIRFIELD COAL COMPANY

are supplying GAS COAL of the best quality on trucks at their siding. This Coal contains 10 per cent. of Cannel, and, as analyzed by Mr. James Paterson, of Warrington, yields 12,600 *cubic feet of* 16·67 *candle gas, with* 1430 *lbs. of good Coke, per ton.* Ash in Coke, 1·88.

Apply to the MIRFIELD COLLIERY, Mirfield, NORMANTON

WANTED, by Samuel Thompson & Co., Colliery Office, Lancaster, APPLICATION for PRICES from Gas Managers who are prepared to receive Tenders for GAS COAL or CANNEL.

John Leigh, Esq., M.R.C.S., F.C.S., &c., &c., in his analytical report of S. T. & Co.'s Coal, says: "It is remarkable for its purity, I have scarcely ever examined a Coal containing so small a quantity of ash, and when Cannel of the best description is scarce, it may well replace this material."

W. C. HOLMES & Co.,

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FOR

GAS AND WATER-WORKS,

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REFERENCES TO UPWARDS OF 400 WORKS.

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Hailes's Improved Retort Settings guaranteed to produce the greatest amount of heat with a small per cent. of Fuel.

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CADZOW COAL COMPANY,

LIMITED.

Cadzow Collieries, Hamilton (Lanarkshire).

Office: 161, Hope Street, Glasgow.

Report on the Cadzow Ell Coal.

By Dr. W. WALLACE, F.R.S.E., F.C.S., Gas Examiner for the City of Glasgow.

I have made a careful chemical analysis and practical assay of an average sample of the Ell Coal from Cadzow Colliery, received on the 5th inst., from Messrs. The Cadzow Coal Company, Hamilton, and have obtained the following results:—

Analysis.

Volatile matters	Gas, tar, &c.	34·03	
	Sulphur	·04	46·12
	Water, at 212° Fahr.	12·05	
Coke	Fixed carbon	52·90	
	Sulphur	·03	53·88
	Ash	·95	
			100·00

Coke (dry) per ton of Coal, 1205 lbs., or 10 cwts. 3 qrs. 1 lb

Analysis of the Coke (Dry).

Carbonaceous or combustible matter	98·18
Sulphur	·06
Ash	1·76
	100·00
Specific gravity of the coal	1·250
Weight of a cubic foot in pounds	77¾

Practical Results.

Gas per ton of coal at 60° F. and 30 in. bar.	10,122 cub. ft.
Illuminating power in standard sperm candles by Argand jet, consuming 5 cubic feet per hour	16·76 candles.
Value of one cubic foot of gas in grains of sperm	402
Equivalent of a ton of coal in pounds of sperm candles	581
Durability of one cubic foot of gas by 5-inch flame	42 min. 45 sec.
Gravity of the gas, air = 1000	448

Remarks.

The sample tested consisted of a complete section of the seam, 5 ft. 6 in. in thickness. The results show that this Coal is well adapted for the manufacture of gas and coke, both being for soft coal of very fine quality. Of the many hundreds of coal samples I have tested, I have not hitherto had one with so small a proportion of ash as the Cadzow Coal.

WILLIAM WALLACE.

Chemical and Gas Laboratory,
139, Bath Street, Glasgow, March 15, 1878.

JOHN HALL AND CO., STOURBRIDGE,

Manufacturers of FIRE-BRICKS, LUMPS, TILES,

AND EVERY DESCRIPTION OF FIRE-CLAY GOODS.

N.B.—A Stock of 15 and 16 in. CIRCULAR RETORTS always on hand. Other kinds made to order on short Notice.

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FOR THE ERECTION AND REBUILDING OF GAS AND WATER WORKS,

RETORT-SETTING—A SPÉCIALITÉ.

ROBUS'S IMPROVED RETORT-SETTINGS, guaranteed to Carbonize a large amount of Coal with a small per cent. of Fuel.

ESTIMATES GIVEN FOR MAIN-LAYING.

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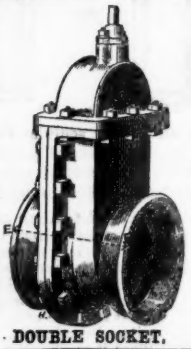

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IMPROVED

SCREW WATER-VALVES,

WITH GUN-METAL FACES.

Proved to 400 feet head of water before leaving the Works

MADE EITHER WITH FLANGED OR SOCKET ENDS.

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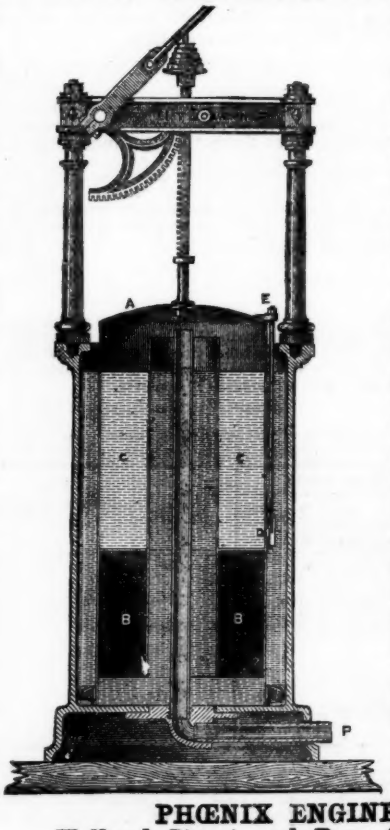
BERMONDSEY, LONDON, S.E

GEORGE WALLER & CO.,

GAS AND HYDRAULIC ENGINEERS,

Patent Compensating Steam Governor,

WITH SELF-CONTAINED WATER-BALANCE.



DESCRIPTION OF THE APPARATUS.

The illustration represents a section of the Patent Governor. The lower part of the Bell A is fitted with a loose Float B, and in the upper part of the Bell is a deep annular Water Chamber C, at the bottom of which is an opening D, with a slide outside regulated by a Screw Spindle E, to allow the water to pass in and out of the Chamber C quickly or slowly, according to circumstances, but when once adjusted the slide does **not require altering.** This Self-compensating Chamber gives great steadiness to the up and down movement of the Bell and effectively prevents the "hunting" motion so common with other Governors, thereby ensuring a more perfect action on the throttle-valve of the Engine **than attained by any other.** The sketch shows the clip lever fixed to work on throttle-valve at an angle, and can work in either direction. P is the Gas Inlet-pipe to Governor.

G. W. & Co. also make **special Steam Throttle Valves,** suitable for working with this Governor, and alter existing Throttle Valves to same plan.

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Holland Street and Bear Gardens, Southwark, S.E.

F. & C. OSLER,

45, OXFORD STREET, LONDON, W.

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ESTABLISHED 1807.

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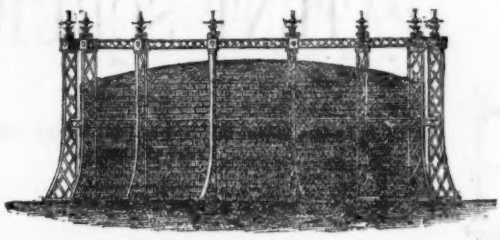
WALL LIGHTS, AND LUSTRES FOR GAS AND CANDLES.

TABLE GLASS OF ALL KINDS.

CHANDELIERS IN BRONZE AND ORMOLU. MODERATOR LAMPS.



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AND ALL REQUISITES FOR EITHER

GAS OR WATER WORKS;

ALSO

MAKERS OF ROOFS, BRIDGES, &c.

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WHITEFRIARS STREET, LONDON, E.C.,

HYDRAULIC ENGINEERS,

AND MANUFACTURERS OF

PUMPING MACHINERY of every Description.

SOLE LICENSEES AND MANUFACTURERS FOR GREAT BRITAIN OF

BLAKE'S PATENT STEAM-PUMPS,

More than 10,000 in use,

ESPECIALLY ADAPTED FOR USE IN GAS AND CHEMICAL WORKS, FOR PUMPING TAR, WATER, AMMONIACAL LIQUOR, ACIDS, &c.

The following are some of the prominent advantages of the BLAKE PUMP:—

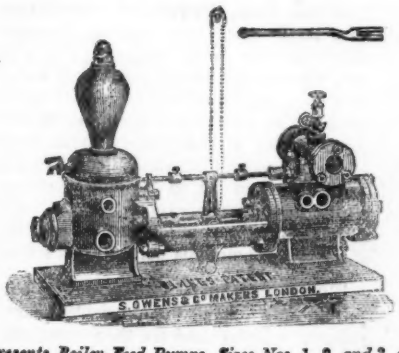
It will start at any point of stroke.

It has no dead point.

It works fast or slow, with the same certainty of action.

It is economical. Has a lead on the slide-valve.

It is compact and durable.



It is interchangeable in all its working parts.

It will deliver more water than any other pump.

It is made of best materials in the most workmanlike manner.

Can be worked at 20 strokes per hour, or 200 strokes per minute.

This Illustration represents Boiler-Feed Pumps, Sizes Nos. 1, 2, and 3, with Hand Lever for working Pump when Steam is not available.

SOLE MANUFACTURERS OF

MANN & OWENS

IMPROVED PATENT GAS-VALVES.

PRICED LISTS AND FULL PARTICULARS FURNISHED ON APPLICATION.

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CONSULTING GAS ENGINEER,

5, NORFOLK STREET, MANCHESTER.

ALFRED LASS,

SPECIAL ACCOUNTANT FOR GAS COMPANIES,

30, GRACECHURCH STREET, LONDON.

Accounts analyzed and Statistics Prepared for Parliamentary Proceedings, Arbitrations, &c.

The Forms of Account, which have been specially designed to meet the requirements of the Gas-Works Clauses Amendment Act, 1871, are now in use by many Gas Companies, and have been universally approved.

The above forms are registered.

Water Companies Accounts also prepared and adjusted.

CONSULTATIONS.

THOMAS CARR & SON,

MANUFACTURERS OF

FIRE-BRICKS, LUMPS, TILES, RETORTS, &c.,

COTSWOOD FIRE-BRICK WORKS, SCOTSWOOD-ON-TYNE.

Also Makers of all kinds of Common Building Bricks, and of Pressed White and Red Bricks for Facing.

BIRTLEY IRON WORKS,

CHESTER-LE-STREET, DURHAM.

Manufactory for every description of Casting and Machinery for Gas-Works and Water-Works.

Warehouse in London for Cast-Iron Pipes and Connexions of all sizes and in any quantity, Scott's Wharf, Bankside, Southwark.

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JAMES OAKES & CO.,

ALFRETON IRON-WORKS, DERBYSHIRE,

AND

WENLOCK IRON WHARF, 21 & 22, WHARF ROAD, CITY ROAD, LONDON, N.,

Keep in London and at their works large stocks of PIPES and CONNEXIONS (1¼ to 36 inches in diameter); also make and supply Retorts, Tanks, Columns, Girders, Special Castings required by Gas, Water, Railway, Telegraph, Chemical, Colliery, and other Companies.

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SILICA FIRE-BRICK CO.,

OUGHTIBRIDGE

Near SHEFFIELD,

Manufacturers of THE ORIGINAL SILICA OR DINAS FIRE-BRICKS. Specially adapted for Gas-Retort Furnaces and for Siemens's Gas-Furnaces. Shipments promptly executed to London, Liverpool, Hull, Grimsby, &c.

TROTTER, HAINES, & CORBETT,

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FIRE CLAY & BRICK WORKS,

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Manufacturers of GAS-RETORTS, GLASS-HOUSE FURNACE & BLAST-FURNACE BRICKS LUMPS, TILES, and every description of FIRE-BRICK.

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BEST GLASS-HOUSE POT and CRUCIBLE CLAYS.

Successors to

E. BAKER AND Co., LATE BRIERLEY HILL, STAFFORDSHIRE.

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PROPRIETORS OF THE

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STOURBRIDGE.

Manufacturers of all Descriptions of

BEST STOURBRIDGE FIRE-BRICKS, LUMPS AND CLAY RETORTS

Of all Dimensions for Gas-Works,

GLASS-HOUSE POTS & CRUCIBLES

ESTABLISHED 1836.

The Highest Award was obtained by H. & M., at the Philadelphia Exhibition, 1876, for Superior Quality of Manufacture. SILVER MEDAL, PARIS, 1878.

GAS AND WATER PIPES.

WILLIAM MACLEOD & CO.,

23 & 25, OSWALD STREET, GLASGOW.

CAST-IRON GAS AND WATER PIPES.

DELIVERY F.O.B., GLASGOW

Prices on application.

C. & W. WALKER,
8, Finsbury Circus,
London, E.C.

MANN & WALKERS' PATENT SCRUBBER.

By Letters Patent in Great Britain, Europe, and the United States of America.

By some important improvements recently patented, the purifying power of these Scrubbers has been much increased, and a stronger ammoniacal solution obtained, which is found to absorb a large portion of the carbonic acid contained in gas, effecting an important saving in money and labour in the lime purifiers, and where oxide only is used, the increase in the illuminating power of the gas obtained by these Scrubbers is shown in a remarkable degree, in consequence of the large quantity of carbonic acid removed from the gas.

It is to be particularly noted that the important results of these Scrubbers do not depend upon the machinery alone. The entire internal construction of the Scrubber bears an almost equally important part. For this reason, where it is desirable to convert existing Scrubbers, whose dimensions happen to be suitable, the work commences by ripping out the whole of the interior of the shell, and beginning the internal construction *de novo* from bottom to top.

Fifty million cubic feet of gas per 24 hours are purified from ammonia by these Patent Scrubbers in a winter's day in the gas-works of London, where the purity of gas supply is the highest in the world, under the chemical restrictions of the Board of Trade.

Generally, wherever a high standard of purification is maintained in the chief cities and towns of the British Provinces and of Europe, these Scrubbers have become established.

By their use the department of purification from ammonia upon a gas-works is made complete, without the aid of prepared oxide of iron, chemicals in purifiers, or any other supplementary process, and the whole ammoniacal residual product contained in the coal is absorbed and obtained in the form most profitable to a gas company, while the requirements of all Acts of Parliament and of the Board of Trade, relating to incorporate gas companies, are satisfied.

Foul Gas, properly condensed, entering the inlet is, by once only passing through the Scrubber, completely purified from ammonia with regular certainty day by day, without any further trouble, or any other process, effected by a very small quantity of clear water let into the machinery room at the top of the Scrubber, which is discharged at the liquor outlet at the bottom, from Newcastle coal at about 18 to 20 ounces strength, from Yorkshire and other coals generally from 25 to 30 ounces strength; while acidulated litmus or turmeric exposed at the Scrubber outlet will not show the slightest discoloration, and there is not a quarter of a grain of ammonia per 100 feet left unabsorbed.

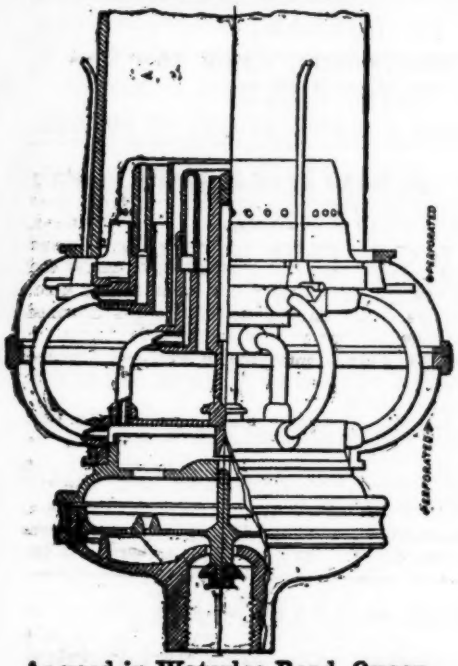
They contain their own engine power, requiring only a small inappreciable quantity of steam from the gas-works boiler, and are then complete in themselves, ready for service.

Applications relating to dimensions and prices should be addressed to us, C. and W. Walker, 8, Finsbury Circus, London, E.C., or to Mr. William Mann, late Superintendent of the Chartered Gas-Works, Blackfriars, London; they should state approximately the largest make of gas in 24 hours on a winter's day, and the smallest make on a summer's day, to be purified.

WILLIAM SUGG'S
IMPROVED SYSTEM OF STREET LIGHTING,

SUITABLE FOR EITHER CANNEL OR COMMON GAS.

SECTIONAL ELEVATION
of 80-candle Burner

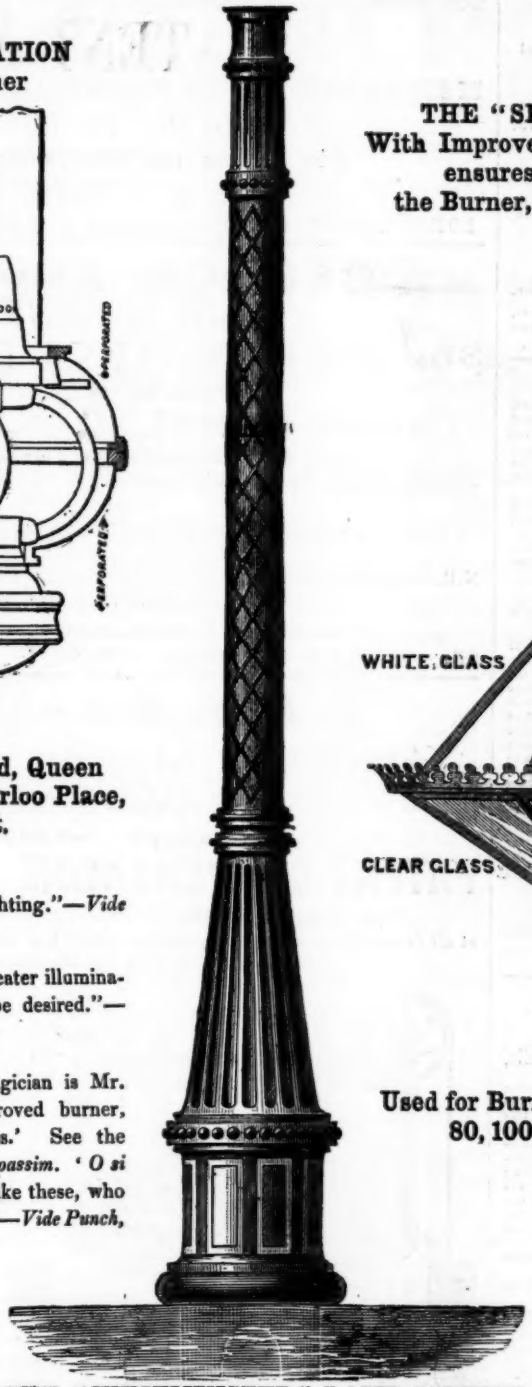


As used in Waterloo Road, Queen Victoria Street, City, Waterloo Place, and Regent Street.

"The perfection of street gas lighting."—*Vide "Times," Feb.* 1, 1879.

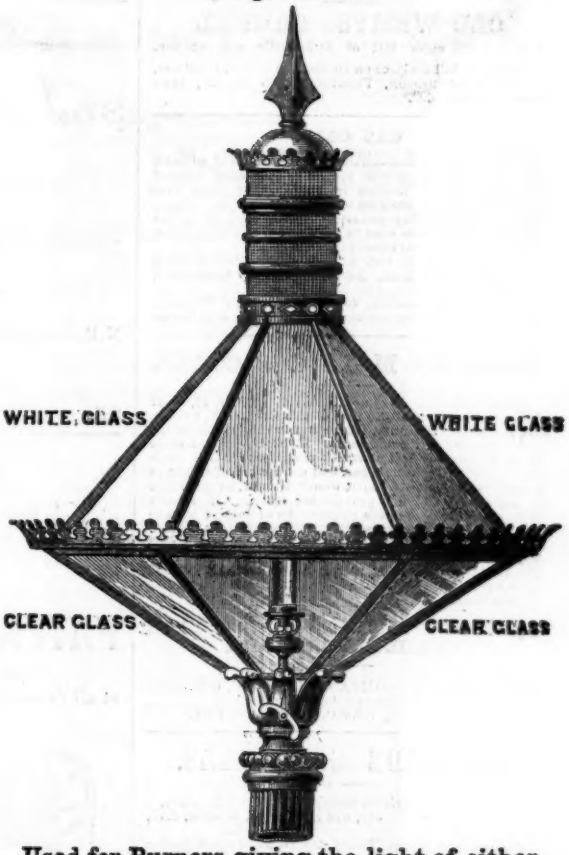
"For all practical purposes no greater illumination than is hereby supplied could be desired."—*Vide "Daily News," Jan.* 13, 1879.

"The real modern Aladdin's magician is Mr. Sugg, who, by means of his improved burner, gives us 'new lamps for old ones.' See the Waterloo Road and Waterloo Place *passim*. '*O si sic omnia!*' If all gas light were like these, who would ask for Edison and electricity?"—*Vide Punch, Feb.* 15, 1879.



THE "WESTMINSTER" LAMP-COLUMN,
Of Improved construction,
8 feet and 9 feet from ground to top of Column.

THE "SHADOWLESS" LANTERN,
With Improved System of Ventilation, which ensures steadiness of the flame of the Burner, even in very windy weather.
(Registered.)



Used for Burners giving the light of either 80, 100, 150, or 200 Spermaceti Candles.

Other Patterns of Lanterns and Columns are in course of construction, and will be shortly Published in this JOURNAL.

WILLIAM SUGG,
GAS ENGINEER,
VINCENT WORKS, VINCENT STREET, WESTMINSTER, S.W.

ROBERT MARSHALL,

CANNEL COAL MERCHANT,

198, ST. VINCENT STREET, GLASGOW.

SHOTT'S BOGHEAD.

HARTHILL CANNEL

Yields 14,920 cubic feet of 40·92-candle gas per ton.

THRASHBUSH CANNEL

12,530 cubic feet of 40·22-candle gas per ton, and 9 cwts. of good coke.

LOTHIAN'S CANNEL

Yields 12,500 cubic feet of 34-candle gas per ton, and 9 cwts. of excellent coke, containing only 4 per cent. of ash.

MUIRKIRK, No. 1, CANNEL

Yields 12,160 cubic feet of 32·5-candle gas per ton, and 10 cwts. of excellent coke, containing only 5 per cent. of ash. This cannel is almost free from sulphur.

OLD WEMYSS CANNEL

Yields 13,320 cubic feet of 32·5-candle gas per ton.

Prices and full analyses on application at above address, or from WEDDERBURN, FERGUSSON AND Co., 21, Lime Street, LONDON, E.C.

GAS COAL.

POPE & PEARSON, LIMITED, have now the authority of several of the most eminent Gas Engineers of London in stating that their Coal yields *in practical working over* 10,000 *cubic feet of gas, with an illuminating power of* 16 *candles;* or by the standard burners now used by the London Gas Companies, an illuminating power equal to 17½ candles.

One ton yields 12½ cwt. of good coke. This Coal can be shipped from Hull, Goole, Liverpool, Morecambe, and Barrow.

For further particulars, apply to POPE AND PEARSON, LEEFARD, West Riding and Silkstone Collieries, near LEEDS.

HEBBURN MAIN GAS COALS.

T. Stone, Esq., of Weymouth, writes on Nov. 17, 1876: "We have used about 12,000 tons of this Coal, with, I think, the best possible results, although not always under the most favourable circumstances. My Coal account made up to Midsummer last showed a makeage of 10,524 cubic feet per ton of 14½-candle gas, and not a hundredweight of Cannel used. This statement would, I know, be incredible to many men, and may provoke the remark, 'How much of it is paid for?' For the gratification of such, I have to say that, of the above quantity, 9866 cubic feet per ton of Coal carbonized were brought to charge and duly paid for, with the exception of about 6s. per cent. for bad debts. The coke is of excellent quality. The above facts I hold to be a greater recommendation to your Coal than any words of mine could be."

PRICES ON APPLICATION, EITHER F.O.B. OR BY RAIL IN TRUCK LOADS.

THE TYNE COAL COMPANY, LIMITED, OWNERS.
W. RICHARDSON, Fitter,
29, QUAYSIDE, NEWCASTLE-ON-TYNE.

HOLMSIDE GAS COALS.

South Metropolitan Gaslight and Coke Company,
589, Old Kent Road, London, S.E.,
Oct. 9, 1873.

At the request of Mr. Hedley, the owner of the Holmside Colliery, I have much pleasure in stating that, for about ten or twelve years past, this Company has taken at least half of its supply of Newcastle Coal from him. I can, therefore, confidently bear testimony to the good quality of the Holmside Coals, and consider they are equal to the best of the Newcastle Coals, in proof of which I may state that this year we are using those Coals exclusively, that the yield of Gas is from 9700 to 9800 feet per ton, and that the quality of the Gas, without any admixture of Cannel, is over 16 candles, as tested by the officer appointed by the Metropolitan Board of Works, using the London Gas Referees test.

The Coke is of excellent quality, and in quantity amounts to about 40 bushels from a ton of Coal.

The annual consumption of Coal amounts to about 75,000 tons.

GEORGE LIVESEY, Engineer and Secretary.

P.S.—I am at this date, Feb. 15, 1875, still using Holmside Coals as largely as ever, and am quite as well pleased with them as when I gave the above certificate.

GEORGE LIVESEY.

We are this year, 1878, using 80,000 tons of Holmside Coal. GEORGE LIVESEY.

FITTING OFFICE:

Address, 75, QUAYSIDE, NEWCASTLE-ON-TYNE.

M. BREMOND'S NAPHTHALINE PROCESS.

A negotiations respecting M. Brémond's patented process for preventing Deposits of

NAPHTHALINE

in Gas Main and Service Pipes should be addressed to Mr. W. H. BENNETT, 32, Great George Street, WESTMINSTER, S.W., or to M. BREMOND, Gas Engineer, Compania Madrileña de Alumbrado y Calefaccion por Gas, MADRID, who may be consulted upon all matters connected with the Gas Industry.

FERRAND DAVIES,

148 GRESHAM HOUSE, OLD BROAD STREET, LONDON, E.C.,
AGENT FOR

THOMAS BARR'S LESMAHAGOW MAIN CANNEL,
AND
NEWTON, CHAMBERS, & CO.'S SILKSTONE GAS COALS.

Analyses and Quotations on application.

BEST GAS COALS

DIRECT FROM THE

MARQUESS OF LONDONDERRY'S COLLIERIES,

COUNTY OF DURHAM.

For Prices and Particulars, apply to

MR. S. J. DITCHFIELD,

LONDONDERRY OFFICES, SEAHAM HARBOUR, COUNTY OF DURHAM.

GEORGE ANDERSON,

GAS AND CONSULTING ENGINEER,

35A, GREAT GEORGE STREET,

WESTMINSTER, S.W.,

PATENTEE and MANUFACTURER of the following Inventions:—

RETORT SETTINGS—giving great Economy of Fuel.
STEAM-ENGINES and EXHAUSTERS, FOUR-WAY VALVES, WASHERS, SCRUBBERS.

FUEL-MACHINE, for Compressing Breeze and Tar.

N.B.—Pamphlet, with Eighteen Illustrations and Letterpress on the Construction of Gas-Works, post free, 2s. 6d.

PRICES AND ALL PARTICULARS TO BE HAD OF THE PATENTEE,

35a, GREAT GEORGE STREET, WESTMINSTER, S.W.

J. & J. BRADDOCK,

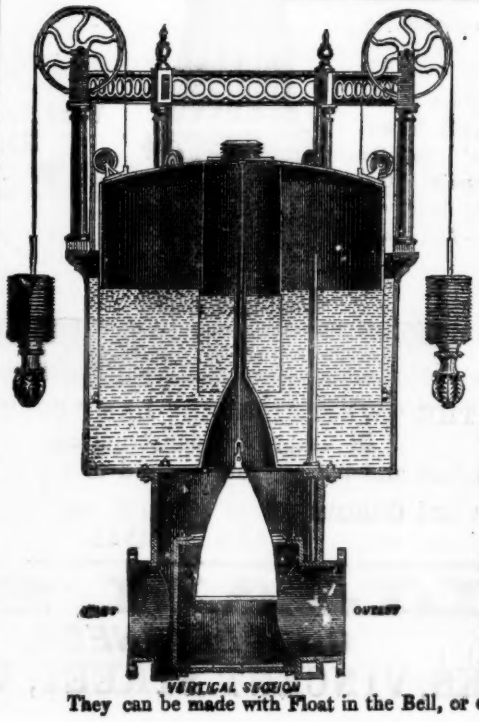
GLOBE METER-WORKS,

OLDHAM,

Beg to submit to Gas Engineers their

PATENT COMPENSATING GAS GOVERNOR,

Which is designed to give an uniform pressure at the Outlet to the Main at all draughts up to the full quantities which the Governors are made to control, such outlet pressure being less than the initial pressure.



VERTICAL SECTION

They can be made with Float in the Bell, or counterpoise as per section.

The uniformity of pressure is obtained by introducing a compensating chamber into the Bell or Holder of the Governor, which compensator is of the same area as the valve, both of which are operated on by the initial pressure, thereby placing the valve in equilibrium, no matter what the initial pressure may be. The action on the Bell is by the Gas passing along a pipe from the outlet, and the pressure is regulated by weights in connexion with the Bell as required.

From the sectional elevation attached hereto, it will be seen that only the Gas required to operate the Bell comes in contact with the water of the tank, which water will remain comparatively sweet and free from odour. That in case of accident to the Bell, no more Gas can escape than would pass up the pipe covering the valve-rod and Bell supply-pipe.

These Governors have been made and sent out of various sizes for from 2 to 24-inch Mains, and give most satisfactory results.

THE SILKSTONE & DODWORTH COAL & IRON COMPANY, LIMITED,

DODWORTH, BARNSLEY.

BENJAMIN WHITWORTH, Esq., M.P. . . . . Chairman.
Mr. RICHARD HARTLEY . . . . . Managing Director.

REAL OLD SILKSTONE GAS COAL.

JAMES PATERSON Esq., Gas Engineer, of the Warrington Gas Company, reported, Aug. 10, 1875:—

"This Coal possesses remarkable qualities as a gas and coking coal, and appears SECOND TO NONE IN THE KINGDOM. It contains the large quantity of 699 lbs. of illuminating matter, and 1498 lbs. of coke to the ton, and produces **12,240** cubic feet of 16·66 candle gas."

The above Company are raising nearly a thousand tons of the Real Old Silkstone Gas Coal per working day.

PRICES QUOTED TO ANY RAILWAY STATION, OR F.O.B. HULL, GRIMSBY, GOOLE, KEADBY, LIVERPOOL, AND FLEETWOOD.

SULPHATE AMMONIA.

R. W. WALLACE & CO.,

60, MARK LANE, LONDON, E.C.,

Are Buyers of SULPHATE AMMONIA in Large or Small Quantities, or Sell on Commission for Gas Companies and Makers.

PLANT ERECTED ON THE LATEST AND MOST APPROVED PRINCIPLE.

AGENTS to THE GASLIGHT AND COKE COMPANY, LONDON, for the SALE of SULPHATE AMMONIA. Works: BECKTON.

PARIS EXHIBITION, 1878.

THREE MEDALS

AND

HONOURABLE MENTION

HAVE BEEN AWARDED TO

JOSEPH CLIFF & SONS

For their Various Exhibits, amongst which is a

SILVER MEDAL

FOR THEIR

PATENT MACHINE-MADE

RETORTS AND FIRE-BRICKS,

Being the Highest Honour given for this class.

Established

1795.

JOSEPH CLIFF & SONS,

THE ORIGINAL

WORTLEY FIRE-BRICK WORKS,

NEAR LEEDS,

London Wharf: No. 4. inside Great Northern Goods Station, King's Cross, N. Liverpool: Leeds Street.

SPECIAL NOTICE.—Our Patent Machine-Made Retorts have now been thoroughly tested, and have proved themselves infinitely superior to those made by hand. At several large works it has been settled, beyond question, that, owing to the compactness and general excellence, more gas is sent to the gasholder from each ton of coal carbonized than is the case with hand-made Retorts.

NEWTON, CHAMBERS, & CO.,

THORNCLIFFE IRON-WORKS AND COLLIERIES,

NEAR SHEFFIELD.

CELEBRATED SILKSTONE GAS COALS.

The various descriptions of Gas Coal produced from the above Collieries possess an unequalled reputation, combining in a large degree the constituents essential for the production of the best quality of Coke and Gas of a high illuminating power.

A recent extensive development of the Collieries enables us to offer increased supplies.

JAS. PATERSON, Esq., of Warrington, after testing various qualities of our Coal, has sent the following testimony of their merits:—

"*Warrington Gaslight and Coke Company,*
Offices, Mersey Street, Warrington, April 23, 1877.

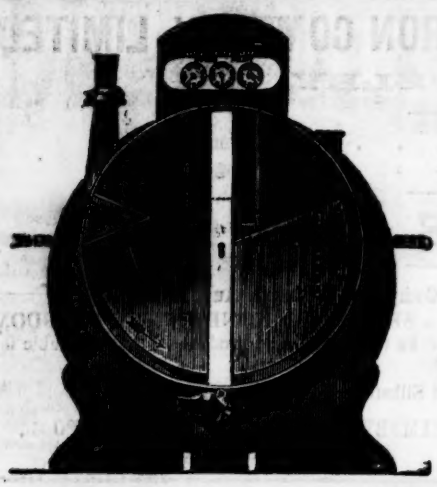
"MESSRS. NEWTON, CHAMBERS, AND CO.,

"GENTLEMEN,—After carefully testing the various samples of Gas Coals sent from your Collieries for analysis, I have pleasure in reporting them as belonging to the highest class of Gas and Coking Coals.

"The average of Nine samples gives a yield of **12,500** cubic feet of **15½**-Candle Gas, being equivalent to **664** lbs. of sperm per ton, and **1420** lbs. of fixed carbon of a very superior quality. All the samples bear a close relation to each other in value.

"Yours truly, "JAMES PATERSON."

Full particulars will be sent on application to us—address as above.



THE

UNVARYING WATER-LINE GAS-METER.

(SANDERS AND DONOVAN'S PATENT.)

"Unquestionably the best Water Gas-Meter now in use."—Thos. G. Barlow, C.E.

Over 120,000 in action.

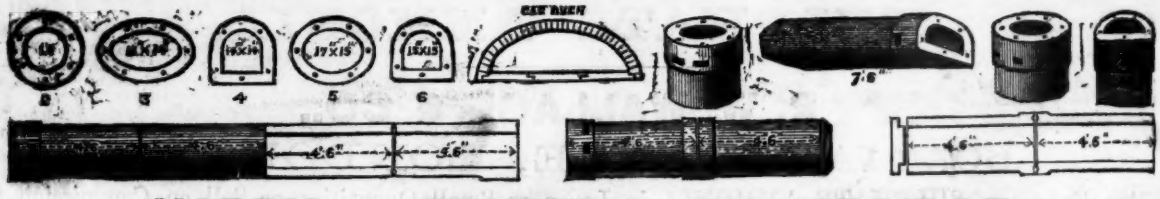
MANUFACTURERS:

THE GAS-METER COMPANY, LIMITED,

KINGSLAND ROAD, LONDON;

WITH

Branch Manufactories at DUBLIN and OLDHAM.



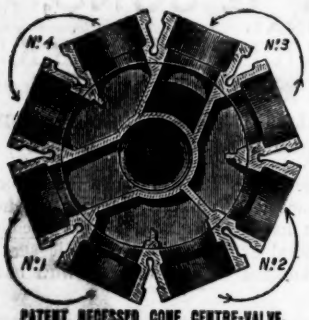
HARRIS & PEARSON, STOURBRIDGE,

Proprietors of Best Clay Mines. Largest makers in the World of Gas-Retorts, Lumps, Tiles, Fire-Bricks, and Fire-Clay Goods of all kinds. 200,000 feet of Gas-Retorts of all Sizes and Patterns in Stock, all in good order. Orders for any Size executed on receipt.

CAST-IRON GAS AND WATER PIPES,

WROUGHT IRON AND LEAD TUBING, GLAZED DRAIN-PIPES,

STAFFORDSHIRE BLUE BRICKS.



PATENT RECESSED CONE CENTRE-VALVE.
Sectional Plan.

R. LAIDLAW AND SON,

EDINBURGH AND GLASGOW,

SOLE MAKERS OF

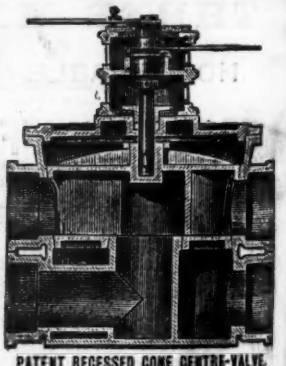
PATENT

RECESSED CONE CENTRE-VALVES,

Constructed on the principle of the ordinary Plug-Cock.

THROUGH-WAY & FOUR-WAY COCKS

Of all descriptions.



PATENT RECESSED CONE CENTRE-VALVE.
Sectional Elevation.

London Office: 6, LITTLE BUSH LANE, CANNON STREET.

D. HULETT & CO.

Invite the attention of Gas Companies, Corporations, and others to their

PATENT STREET LAMPS,

Which are so constructed that neither putty nor other materials are required to secure the glass. No hacking out of old putty, which frequently destroys the frames. A new pane of glass can be inserted in two or three minutes by any inexperienced person, the glass being secured by a hinged flap and turn button.

PRICE, with Opaline Reflecting Top, 12s.; with Fluted Glass Top, 10s. 6d.
Also made EXTRA STOUT recommended for its durability.

D. HULETT'S IMPROVED SERVICE CLEANSER,

By the use of which stoppages in service and other pipes are freed from naphthaline and other obstructions in a few minutes. PRICE 73s. net.

HULETT'S PATENT MERCURIAL REGULATOR,

For inserting in mains, to prevent the excess of pressure in high ground, or other elevated positions.

PATENTEES OF IMPROVED WET AND DRY GAS-METERS.

Makers of all kinds of Pressure-Gauges, Gaseliers, and every kind of Gas-Fittings for the Trade.

GAS HEATING AND COOKING STOVES.

55 and 56, HIGH HOLBORN, LONDON.

London: Printed by Walter King, for the Executors of the late William Boughton King (at the office of Clayton and Co., 17, Bouverie Street, Fleet Street), and published by him at No. 11, Bolt Court, Fleet Street, in the City of London.—Tuesday, April 22, 1879.